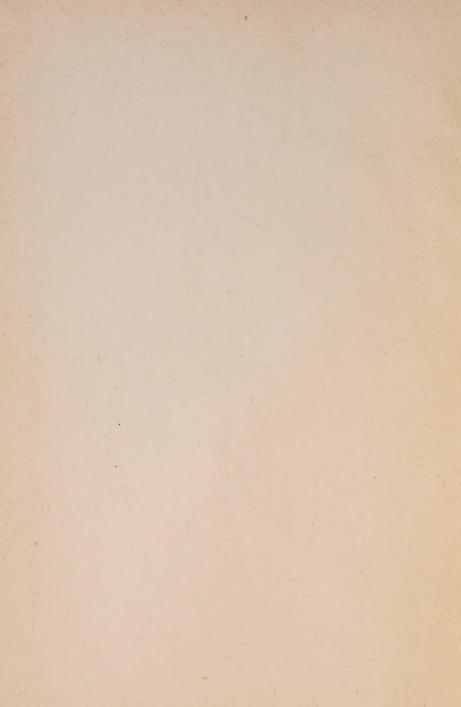


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DOMINION OF CANADA DEPARTMENT OF AGRICULTURE DOMINION EXPERIMENTAL FARMS

REPORT

FROM THE

DIVISION OF HORTICULTURE

For the Year ending March 31, 1915

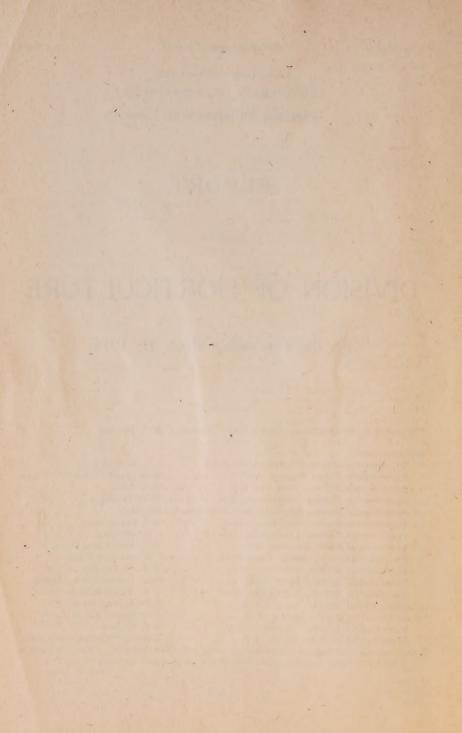
PREPARED BY

The Dominion Hortlculturist, Central Farm, Ottawa. - W. T. Macoun.

Superintendent-Experimental Station, Charlottetown, P.E.I. - - J. A. Clark, B.S.A. Experimental Farm, Nappan, N.S. - - - - - W. W. Baird, B.S.A. Experimental Station, Kentville, N.S. - - - - W. S. Blair. Experimental Station, Fredericton, N.B. - - - - W. W. Hubbard. Experimental Station, Ste. Anne de la Pocatière, Q. Jos. Bégin. Experimental Station, Cap Rouge, Que. - - - G. A. Langelier. Experimental Station, Lennoxville, Que. - - - J. A. McClary. Experimental Farm, Brandon, Man. - - - - - W. C. McKillican, B.S.A. Experimental Farm, Indian Head, Sask. - - - T. J. Harrison, B.S.A. Experimental Station, Rosthern, Sask. - - - - W. A. Munro, B.A., B.S.A. Experimental Station, Scott, Sask. - - - - M. J. Tinline, B.S.A. (Acting). Experimental Station, Lethbridge, Alta. - - - W. H. Fairfield, M.S. Experimental Station, Lacombe, Alta. - - - - G. H. Hutton, B.S.A. Experimental Farm, Agassiz, B.C. - - - - P. H. Moore, B.S.A. Experimental Station, Invermere, B.C. - - - - G. E. Parham.

Experimental Station, Sidney, B.C. - - - - S. Spencer (Foreman-Manager). Experimentalists of Substations at Salmon Arm, B.C., Fort Vermillion, Grouard, Grande

Prairie and Forts Resolution and Providence, in northern Alberta.



REPORT OF THE DIVISION OF HORTICULTURE.

OTTAWA, March 31, 1915.

J. H. GRISDALE, Esq., B.Agr.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the twenty-eighth annual report of the Division of Horticulture, being the seventeenth since I took charge of the Division.

There will be found included in this report the reports of the work at the Central Farm, Ottawa, and those which have been written by the Superintendents of the Experimental Farms and Stations at Charlottetown, P.E.I.; Nappan, N.S.; Kentville, N.S.; Fredericton, N.B.; Ste. Anne de la Pocatière, Que.; Cap Rouge, Que.; Lennoxville, Que.; Brandon, Man.; Indian Head, Sask.; Rosthern, Sask.; Scott, Sask.; Lethbridge, Alta.; Lacombe, Alta.; Agassiz, B.C., and Invermere, B.C. There is also a report from Thos. A. Sharpe, Salmon Arm, B.C., and from the Sub-stations at Fort Vermilion, Peace River District, Alta., Grouard, Lesser Slave Lake, Alta., Grande Prairie, and Forts Resolution and Providence in Northern Alberta.

As last year, the report of the work on the Central Farm has been divided into four parts, the more general and introductory part with some results in detail prepared by myself, and the other parts of the report prepared by the assistant in charge of each sub-division, namely, Pomology, Vegetable Gardening, Ornamental Gardening and Plant Breeding. As the assistant in Vegetable Gardening volunteered for active service in November, the Assistant in Pomology, who is temporarily in charge of the vegetable work, completed the report on vegetables, which was already well advanced.

BRANCH FARMS.

The rapidly increasing number of Branch Stations has meant a corresponding increase of work for the Horticultural Division. The new Superintendents are anxious to get assistance from the Horticultural Division in the planning of experiments and the laying out of the orchards and other plantations, and at the older Farms and Stations there is always something in which the Dominion Horticulturist or his assistants can be of service. It is planned to pay one or more visits to each Farm and Station each year.

The writer left home on March 28, 1914, and on April 2 visited the farm of Mr. Thos. A. Sharpe, Salmon Arm, B.C., who is conducting some experiments in fruits for the Dominion Government. April 3 was spent at the Experimental Farm, Agassiz, B.C. It was decided to remove the few apple trees left in the old orchard as most of them were badly affected with the Apple Tree Anthracnose. The new farmers' orchard and small fruit plantation was in a healthy condition. The Experimental Station at Sidney, Vancouver Island, was visited on April 6. Four days were spent here in laying out and planting the various orchards and plantations. Planting plans prepared by the writer at Ottawa were used. The tree fruits planted included apples, pears, plums, cherries, peaches, apricots, nectarines, quinces, persimmons, oranges, figs, filberts, walnuts and chestnuts. About one-quarter of an acre of holly was planted and the same area of Cascara (Rhamnus Purshianus). Plans for experiments in bulb

culture were made. An avenue of tulip trees was planned for the East Saanich road and planted. Several beds for shrubs and herbaceous plants and plantations of rhododendrons were laid out near the lower entrance of the ravine, also a bank of Japanese roses near the Saanich road.

Lethbridge was reached on April 15. It was found that fruit trees had come through the winter well and there was a good promise of apples which later was fulfilled. It was decided to devote about three and a half acres near the Canadian Pacific railway to orchard and garden which would not be irrigated and would serve as a demonstration to settlers, as there is a large area of land in southern Alberta where irrigation is not possible. It was planned at this time to extend the lawn in front of the Superintendent's house to the public road.

April 17 was spent at the Lacombe Station. It was considered advisable to plant willows for windbreaks across the orchard as the latter is still very much exposed. Some more groups of shrubbery were planned on the ornamental grounds. As the shrubbery border along the western boundary, south of the orchard, would be cut off from the rest of the horticultural area owing to fences necessary for stock, it was decided to remove these, and the best of them were utilized for the ornamental grounds in front of the house.

On April 20 the Experimental Station at Scott was visited. A good many of the fruit trees were found injured by winter, but some of the hybrid apples were quite hardy and promise to succeed. Young evergreens came through the winter well. While at Scott I arranged with the Superintendent to have vacant spaces in the apple orchard filled and plum seedlings from Brandon set out. A few more clumps of trees were planned for the ornamental grounds. Many matters relating to the horticultural work were discussed with the Superintendent, as is the case at all the Branch Farms and Stations.

The Experimental Station at Rosthern, Sask., was visited on April 21. A marked improvement was found in the horticultural work there. The hybrid apple trees came through the winter well and promised considerable fruit. It was arranged to have some hedges put across the area devoted to vegetables and the nursery to furnish still more protection.

I was at the Indian Head Farm on April 22. The plantation of young Russian apple seedlings was found in good condition, many of the trees having wintered well. While there I planned three groups of ornamental trees at the south side of the new lawn where the orchards used to be, which I think will make a decided improvement. As the effect of the flower garden was injured to a considerable extent by the position of the meteorological instruments it was decided to move them to the small area near the present office.

April 23 was spent at the Brandon Experimental Farm. As at Indian Head, a difference was noticed in the hardiness of the Russian seedling apple trees in nursery rows, though many had wintered well. It was decided to replace the row of Manitoba maples on the low land between the public road and the maple and spruce avenue with laurel-leaved willow as the former do not do well there. Other matters in regard to the horticultural work were discussed with the Superintendent.

On May 12, 1914, I visited the Experimental Station at Cap Rouge, Que., and tound that most of the trees had come through the winter well. The orchards, at present, promise to be a good demonstration that orcharding can be successfully carried on in the vicinity of Quebec. In the orchard which has been planted longest a four-year rotation of vegetables or roots, grain, clover and timothy is being followed between the trees, leaving four feet on each side of the rows for cultivation and cover crop. In the newer orchards planted in 1913 where there are fillers and the trees planted closer, I planned with the Superintendent some cultural experiments. I was again at Cap Rouge on September 23, and found that the trees had made good

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growth during the season. I made a number of suggestions to the Superintendent and the foreman in charge of the horticultural work in regard to the care of the various plantations.

The Experimental Station at Ste. Anne de la Pocatière, Que., was visited on May 13 and 14, 1914, when I planned and helped to plant the orchard extension for which the land was prepared last year. I also laid out some small fruit plantations in the orchard area. Most of the fruit trees had apparently come through the winter well, and there is promise of a good orchard here. As the winds are very strong in winter, a row of spruce was planted across the north end of the orchard for a windbreak. I was again at Ste. Anne on September 24 and went over the horticultural work with the Superintendent. Some of the vegetables and flowers did well this year notwithstanding the severe drought. Most of the fruit trees planted in the spring grew, and the orchard on the whole looked well. The land near the front of the Farm where the ornamental grounds will be was being drained.

I was at the Station at Lennoxville, Que., on May 15 and went over the farm with the Superintendent and formed an idea of how the area to be devoted to horticulture might be laid out to the best advantage. It was arranged to plant a few things such as corn, tomatoes and seed of herbaceous perennials. A nursery of ornamental plants had already been planted from material ordered at the Central Farm. In June I was again at Lennoxville with the Director, when the boundaries of the horticultural area were decided upon. On August 19 I visited Lennoxville a third time, and with my assistant, Mr. M. B. Davis, went over the orchard area to find out where inequalities were in view of cultural experiments it was proposed to try. Horticultural matters were also discussed with the Superintendent and gardener.

I arrived at the Experimental Station, Fredericton, N.B., on August 20. Apple. plum, pear and cherry trees planted last spring from a plan which had been prepared at Ottawa were found to be doing well. Two main roads through the proposed ornamental grounds were staked out while I was there. It was decided to try rolling a piece of the natural sod in the meantime and cutting the grass with a lawn mower in 1915.

The Experimental Farm, Nappan, N.S., was visited on August 21. There were a number of scattering plum, pear and cherry trees in the old orchard which were not thriving and which bear little or no fruit, and I suggested that after getting notes on their present condition and past records they should be removed to make room for something that would be likely to do better.

August 22 was spent at the Kentville Experimental Station, and the various plantations were visited with the Superintendent, and most things were found to be doing well. There had been very marked progress at this station since my last visit. Good success had been obtained this year with the Montreal muskmelon at Kentville. Other vegetables and flowers were also doing well. The questions of a better main entrance and something more effective to stop the wash from the hill were discussed with the Superintendent.

On August 25 and 26 I was at the Experimental Station. Charlottetown, P.E.I. Some changes were suggested in the arrangement of the beds at the side of the Superintendent's house to give more lawn in the foreground. Raspherries were still abundant at this date and strawberries were just over. The young orehards are doing very well, but there is little fruit vet. A hedge of Berberis Thunbergii was suggested to separate the front lawn from the orchard, which would, we thought, give a better finish to the lawn.

MEETINGS, ADDRESSES, AND PLACES VISITED BY THE STAFF OF THE HORTICULTURAL DIVISION.

While it is not possible for the staff of the Horticultural Division to visit all the places to which it seems desirable to go, and to attend all the meetings which it seems important should be attended, an effort is made each year to do considerable work of this kind in order that the Division should be kept in close touch with the work of others and in order that the results of the work of the Horticultural Division should be brought before the people.

On August 4-6, 1914, I attended the annual meeting of the Canadian Horticultural Association at Toronto, Ont., and gave an address on "Hardy Conifers." While attending this meeting, advantage was taken of visiting some of the large florists' plants, among them the Dale greenhouses at Brampton, Ont. While on a visit to the Experimental Station at Lennoxville, Que., on August 19, I made a motor trip through the district to learn what the horticultural conditions were, and passed through Compton, Massawippi, Ayer's Cliff and North Hatley, obtaining a very good idea of the country and the climate of the district.

On September 2, 3, and 4, I attended the fourth Dominion Fruit Conference at Grimsby, Out. In addition to learning what was possible at the sessions, I participated in the motor trip which was organized for the occasion through the Niagara district, and was able to see many orchards and fruit plantations and the methods adopted by the growers.

When at the Experimental Station, Charlottetown, on August 25, I assisted in judging the flowers at the second annual exhibition of the Floral Association of Prince Edward Island, and on September 24, while visiting the Experimental Station at Ste. Anne de la Pocatière at St. Roch des Aulnaies, Que., I judged the fruit at the exhibition of the L'Islet Horticultural Society at St. Roch des Aulnaies.

On November 13, I gave an address before the annual meeting of the Ontario Fruit Growers' Association at Toronto on "Yields of Varieties of Apples at Different Ages," and on November 11 before the annual meeting of the Ontario Horticultural Association on "Recent Experimental Work and Best Flowers," and a paper on "How to Grow one's own Vegetable Seeds" before the Ontario Vegetable Growers' Association, Toronto, November 10, 1914. An address on "The Life of Apple Trees in the Province of Quebec" was given before the annual meeting of the Quebec Pomological Society, Macdonald College, on December 2, 1914.

On February 9 and 10 I attended "Farmers' Week" at the Agricultural College of Cornell University, Ithaca, N.Y., for the special purpose of listening to the addresses at the meeting of the New York Potato Growers' Association held during that week. I also attended a business meeting of the National Potato Growers' Association.

During February and March I attended meetings and gave addresses at most of the following places in connection with the Government's campaign for "Patriotism and Production," two meetings being held in each place, my subject in most cases being "Gardening in Cities and Towns," though on some occasions I spoke especially on potato culture. In connection with these addresses I advocated a "Patriotic Vegetable Gardening Competition" for cities and towns, and prepared some suggestions in regard to the organization of such. The places and time of meetings were: London, Ont., February 11; Woodstock, Ont., February 12; Brantford, Ont., February 18; Fergus, Ont., February 19; Kingston, Ont., February 25; Belleville, Ont., February 26; Perth, Ont., March 4; Peterborough, Ont., March 5; Richmond, Que., March 1; Cowansville, Que., March 2.

On March 8 I addressed the Ottawa Household League on "Backyard Gardening," and the pupils of the Rideau Street and Osgoode Street schools on March 17 on the same subject, and the Vegetable Growers' Association on "How to Control Injurious Insects" on March 11.

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Mr. M. B. Davis, Assistant in Pomology, gave an orchard demonstration at Renfrew, Ont., on July 8, 1914, under the auspices of the Renfrew Farmers' Institute. He gave an address on "Co-operation" before the summer meeting of the Quebec Pomological Society at Abbotsford, Que., on September 9, also judging the fruit at the exhibition in connection with this meeting. On November 12 he delivered an address on "Orchard Heaters" before the annual meeting of the Ontario Fruit Growers' Association, Toronto, Ont., and on the same subject before the annual meeting of the Quebec Pomological Society on December 2. He gave an address on "Home Fruit Gardens" at North Gower, Ont., on December 10, and on the 16th on "Fruit Growing" at Burnstown, and on the 17th on the same subject at Gratton, Ont., in the afternoon and evening, the last two being under the auspices of the Renfrew Farmers' Institute. On February 15, 1915, he gave an address at the Short Course at Perth, Ont., in the afternoon, and in the evening an address on "Vegetable Gardening" before the Perth Horticultural Society.

Mr. F. E. Buck, Assistant in Ornamental Gardening, judged the flowers at a number of exhibitions during the year. On July 10, 1914, he judged at an exhibition held at Sidney, B.C.; on September 2 and 3, at the Provincial Exhibition, Quebec; on September 12, at the exhibition of the Smiths Falls Horticultural Society, and on September 15 at the exhibition of the Perth Horticultural Society. During July he visited the Experimental Farms at Brandon, Indian Head, Lethbridge, Agassiz and Sidney for the special purpose of assisting in improving the system of labelling at these places, but particularly at Indian Head. He presented the report of the "Names Committee" at the annual meeting of the Ontario Horticultural Association, Toronto, November 12, 1914, and gave an address at the Short Course in Horticulture, Macdonald Cellege, Que., February 10, 1915, and an address before the Westboro, Ont., Horticultural Society in May and October, 1914, and in March, 1915.

In order to gain information in regard to what others were doing in plant breeding, Mr. A. J. Logsdail, Assistant in Plant Breeding, during the summer of 1914 visited the Horticultural Experiment Station, Vineland, Ont., the College of Agriculture, St. Anthony Park, Minn., the Minnesota Fruit Experiment Station, Vambra Heights, Minn., the College of Agriculture, Brookings, S.D., the College of Agriculture, Ames, Iowa, and the College of Agriculture, Urbana, Ill. He judged the horticultural exhibits at the Horticultural Exhibition, Haileybury, Ont., and at the Agricultural and Horticultural Show, Vankleek Hill, Ont. He also visited the Experimental Station at Lennoxville, Que., in the summer of 1914 to arrange about the growing of some improved vegetables. He gave an address on the "Breeding of Vegetables" before the annual meeting of the Ontario Vegetable Growers' Association, Toronto, Ont., November 10, 1914.

MATTERS OF SPECIAL INTEREST AND IMPROVEMENTS.

The new greenhouses which were not completed at the close of the last fiscal year have now been in use about a year and have proved very satisfactory. Crops of tomatoes, melons, cucumbers, cauliflowers, beans, lettuce, radishes, grapes and strawberries have been grown for experiment, besides many kinds of flowers. There was a tine chrysanthemum show of the best varieties in the autumn of 1914. Five recording thermometers were purchased so that the temperature of the houses at all hours of the day and night would be recorded. The premises above the boiler and potting house are now used for offices. An outside cellar connected with the boiler house was constructed for storing plants in winter.

Four hundred orchard heaters or fire pots for experimental work were purchased and are reported upon elsewhere. A large collection of European grapes was set out, it being believed that the earlier varieties will eventually become popular in Canada, for

home use especially. Two power spray pumps were purchased, one especially for spraying ornamental and shade trees. Three large sprayers each capable of throwing a spray for a radius of fifty feet were obtained and were of great value in keeping the lawns in fair condition during the great drought of 1914.

PUBLICATIONS.

During the past year, in addition to the Annual Report and the Summary of Horticultural Results there have been published by the Horticultural Division the following bulletins and pamphlets:

"The Planting and Care of Shade Trees," Bul. 19 S.S., by F. E. Buck, B.S.A.

"Renovation of the Neglected Orchard," Bul. 79, by M. B. Davis, B.S.A.

"How to Protect Fruits, Vegetables and Ornamental Plants from Insects and Fungous Diseases," Pam. 12, by W. T. Macoun.

"The Home Vegetable Garden and a Patriotic Gardening Competition," Pam. 13, by W. T. Macoun.

"Growing Grapes for Home Use," Exhibition Circular No. 11, by W. T. Macoun.

"Top-Grafting," Exhibition Circular No. 15, by W. T. Macoun.

"How to make and use Hot beds and Cold Frames," Exhibition Circular No. 16, by W. T. Macoun.

"Protection of Fruit Trees from Mice and Rabbits and Care of Injured Trees," Exhibition Circular No. 17, by W. T. Macoun.

The following contributions were made to the Agricultural Gazette of Canada during the year:—

April, 1914.—" Experiments with Varieties of Apples," by W. T. Macoun.

October, 1914.—"Ornamental Gardening at the Dominion Experimental Farms and Stations," by W. T. Macoun.

January, 1915.—" Fire Pots as Protection Against Frost," by M. B. Davis, B.S.A. February, 1915.—" The Propagation of Ornamental Plants suitable for School Surroundings," by F. E. Buck, B.S.A.

March, 1915.—" Fruit Culture at the Experimental Farms," by W. T. Macoun.

And for the Agricultural War Book an article was contributed on "Growing Potatoes for Home and Market," by W. T. Macoun.

CORRESPONDENCE.

The correspondence of the Horticultural Division continues to grow rapidly. The depression in business would seem to have turned the attention of Canadians more to home life, and there are many inquiries for information in regard to the growing of vegetables and the beautifying of homes especially. So great has been the demand for bulletins that several have been exhausted and new editions have either been published or are under way. During the fiscal year 1914-15 there were 7,586 letters received and 7,979 despatched, which is more than a thousand increase in those received and those sent out over last year.

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DONATIONS.

There are some donations received by the Horticultural Division every year, and it is a pleasure to be able to make public acknowledgment of these in the annual report. Following are those which were received in 1914:-

FRUITS.

Sender.		•	Donation.	
Alexander, Mr. Ottawa, On Bradt, E. P., Morrisburg, O. Camp, Chas. B., Cheney, No.	nt	Scions of Cuttings	Seedling apple.	na, Crecius, Can elight, Guigon ar
Chabot, Bernard, St. Laure		Twenty-fi	rleans, Que.	
Easton, W., Cobble Hill, B. Fairfield, F. S., Orono, On	t	Trees of Colou	New Spy seedling, ir Read hardy appl	Moses Sarky, ar
Hammond, Wallace, Carleto Loomer, E. I., Kingsport, N Newman, C. P., Lachine Lo	.S	Scions of	"Loomer" seedlin	g apple.
Niemetz, V. P., Charkhow, Peters, S. C., Queenstown,	Russia	Apple, pl	um, pear and cherr seedling apple.	y Scions.

VEGETABLES.

Bicroft, G. W., London, Ont	Seed of Byron Pink tomato.
Dictor, G. W., Editedia, Ont. T. T.	Vogetable goods
Burpee, J. Atlee, Philadelphia, Pa	Vegetable seeds.
Fairfield, F. S., Orono, Ont	Aroostook Wonder potatoes.
Gellatly, D., Gellatly, B.C.,	Seed of Earliest on Earth tomato.
Grace, Mrs. E., Strassburg, Sask	Dalmeny Radium potato.
Whale, J. B., London, Ont	

ORNAMENTAL PLANTS.

Burpee, J. Atlee, Philadelphia, Pa Flower Hill, D., Dundee, Ill White	seeds. Pine seedlings.
Jackson, H. F., Argyle ave., Westmount, QueShrub s Matthews, Mr., Allan Gardens, Toronto,	eeds.
Ont Seedling Osler Sir E. Toronto, Ont Chrysar	itnemum cuttings.
Toronto Parks Board, Toronto, Ont Plants Morris, Frank, Norwood Grove, Man Plant o Thomann & Son, Jacob, Rochester, N.Y Rochest	f White Anemone Nuttalliana.

PLANT BREEDING.			
Bass, G., Otter City, Kansas		ł	
land, Ont	plants.		
Ross, W. K., Scotsburn Station, N.S., Corn.	plants from the Charlotte Island,	Atlin B.C.	District
Turney, A. G., Fredericton, N.B Wild strawberry	plants.		

STAFF OF THE HORTICULTURAL DIVISION.

M. B. Davis, B.S.A., Assistant in Pomology. F. E. Buck, B.S.A., Assistant in Ornamental Gardening. A. J. Logsdail, B.S.A, Assistant in Plant Breeding.

W. T. Macoun, Dominion Horticulturist.

C. F. W. Dreher, B.S.A., Assistant in Vegetable Gardening.

M. D. MacCallum, Secretary.

H. Holz, Foreman of the Division.
J. McKee, Foreman in charge of Greenhouses.
H. J. Read, Foreman in charge of Records.
W. T. Ellis, Records' Clerk.
John Melvin, Foreman in Orchards.
Howard Russell, Foreman in Orchards.
J. Taggart, Foreman on Ornamental, Grounds.
F. Taggart, Foreman on Ornamental Grounds.
Geo. Perrin, Assistant Foreman in Greenhouses.
G. E. Bass, Stenographer.
Miss Bertha Shields, Stenographer.

ACKNOWLEDGMENTS.

There has been marked progress during the past year in the Horticultural Division and this has been possible only through the hearty co-operation of those associated with me in the work. Mr. M. B. Davis, B.S.A., Assistant in Pomology, has done good work during the year, and the experiments with fruits have developed considerably since he took charge. During my absence from home he has performed the administrative work of the Division satisfactorily and since November, 1914, has had temporary charge of the Vegetable Gardening, Mr. Droher having enlisted for service. The Ornamental Gardening continues to develop under Mr. F. E. Buck, B.S.A., and many new and interesting plants are being tested and cultural experiments tried under his direction. The Plant Breeding was continued by Mr. A. J. Logsdail, B.S.A., who has some very promising and interesting new things as the result of his work. Mr. C. F. W. Dreher, B.S.A., Assistant in Vegetable Gardening, enlisted in November, 1914, after having carried on the experimental work during the growing season.

I desire to express my appreciation of the services of my secretary, Mr. M. D. MacCallum, who has performed his duties in a very satisfactory manner during the past year. As foreman of the Division, Mr. H. Holz continues to render valuable help in the outside work. The success of the new greenhouses during the past year is sufficient testimony of the skill of Mr. J. McKee, the foreman of them. With him is associated Mr. Geo. Perrin, who with his long experience in the old greenhouses, is of much assistance.

With the large number of farms and stations now in the Experimental Farm System the work of keeping a return of the horticultural plants and experiments on each is considerable. Mr. Horace Read is in charge of the Central Card Record System and has again done his work satisfactorily. He is ably assisted by Mr. W. T. Ellis. I desire also to express my appreciation of the work of Messrs. John Melvin and Howard Russell, Foremen in the Orchards, and J. Taggart and F. Taggart, Foremen on the ornamental grounds. With the rapidly increasing correspondence and other work of the central office it is important to have efficient office assistance, and I have pleasure in acknowledging the satisfactory work of Mr. G. E. Bass and Miss Bertha Shields, stenographers. I wish to thank the other men in the Horticultural Division at Ottawa for the work they have cheerfully performed.

I desire again to acknowledge my indebtedness to the Superintendents of the Branch Farms and Stations for their hearty co-operation in developing the horticultural work.

I have the honour to be, sir, Your obedient servant.

W. T. MACOUN,

Dominion Horticulturist.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

CHARACTER OF SEASON.

During the past seventeen years a record has been kept of the date when the frost was out of the ground in parts of the Horticultural Division. In 1914 the date was April 13. The average date for the seventeen years is April 12.

While it was showery during the month of April, 1914, the showers were so light that they did not amount to much. It was a cool month on the whole. The highest temperature was 70° F. on the 19th, but it was warm for only a few days. On the 13th the lowest temperature, which was 13° F., was recorded. May was a warm, dry month. The last spring frost recorded was on the 2nd, when the temperature was 31.2° F. This is much earlier than usual for the last frost. The highest temperature was 92.8° F. on the 27th. This was also the highest temperature for the whole summer. It was warm from the 18th to the 31st. During the month the temperature was over 80° F. on nine days; the nights, however, were cool. Only 0.30 inch of rain fell during May. Owing to this long spell of dry weather the first vegetable seeds sown would not in many cases germinate and a second sowing had to be made. By the end of the month the grass on the lawns was burned in places, which is very unusual for May. June was a moderately warm month, the highest temperature being 91° F, on the 24th It was 82° and over on eight days, but they were the only really warm days of the month. The drought continued until June 18, when about one-third of an inch of rain fell, doing much good. Previous to this things were suffering badly. The strawberries were kept from drying up by drenching them with water by means of the power sprayers. On the 21th there was another good rain, which came just in time, as things were suffering again.

July was a warm month with little rain. It was 80° F. and over on nineteen days and 90° and over on four consecutive days. The highest temperature was 92° F. on the 17th. There was so little rain during the month that vegetables continued to suffer. A good rain on August 2 helped matters very much, but August was a dry month also. It was only moderately warm in August, though it was over 80° on nine days. The highest temperature was 90° on the 10th. It was warm to moderately warm during September, except the last week, which was cool. The temperature was 80° and over on seven days. The highest temperature was 92° on the 22nd. On the 26th there was a light frost in low spots which killed tomato and squash foliage. The first autumn frost recorded by the official thermometer was on the 29th, when the temperature was 30° F. Potatoes were badly injured and dahlias, cannas and other tender things were considerably hurt. While September was rather dry, vegetable crops improved very much during this month, potatoes doing particularly well.

It may be well to record here the precipitation during the six growing months of 1914, as it was the lowest in twenty-five years: April, 2.47 inches; May, 0.30 inch; June, 2.21 inches; July, 1.41 inches; August, 2.38 inches; September, 2.09 inches. Total, April to September, 10.86 inches.

October was moderately warm during the first half of the month and cool in the latter part. The highest temperature was 77° F. on the 4th and the lowest 22° on the 27th. The first frost of the month was on the 14th, when the temperature was 29.4°. This injured many of the flowers, but up to this time there had been a good show. There was no severe frost until the 25th when it was 27.6°, the frost killing practically

OTTAWA.

all the flowers. Up to this time the hardy annuals made a fair show. The weather was mild for the greater part of November. The lowest temperature was 2.2° below zero on the 18th, the only day it was below zero during the month. The temperature rose above freezing on twenty-three days. There was a heavy fall of snow on the 17th, and winter may be said to have set in on that date, though the snow was gone again on December 1, and the ground did not freeze up until December 4. The first two weeks of December were comparatively mild, the temperature rising above freezing on seven days. The remainder of the month was moderately cold with the coldest day on the 26th, when the temperature was 25° F. below zero. It was below zero on nine days during the month. There were about 9 inches of snow on the ground at the end of the month.

January was only moderately cold. The lowest temperature was 25·4° below zero on the 30th, which was the coldest day of winter. It was below zero on nine days during the month. February was moderately cold to mild with the temperature above freezing on 13 days. The lowest temperature was 10·5° below zero on the 4th, and it was only five times below zero during the month. As in previous months this winter there was very little precipitation, and by February 24, owing to mild weather the ground was bare in places, but up to this time since the middle of December the ground had been covered with snow. Owing to the scarcity of snow this winter the loss in the rose garden is sure to be very great as many of the bushes have not been completely covered with snow all winter.

The month of March was mild, the temperature being above freezing on twenty-three days. The highest temperature was 45.6° on the 24th, and the lowest 3° on the 3rd. It was not once below zero during the month. By the end of the month the ground was practically bare The past winter has been a relatively mild one and on only two occasions was it as low as 20° below zero. There was very little snow, and the greatest depth at any time would be about 18 inches. The past year has been by far the driest during the past twenty-five years, there being more than 10 inches less precipitation than the average.

FRUIT AND VEGETABLE CROPS.

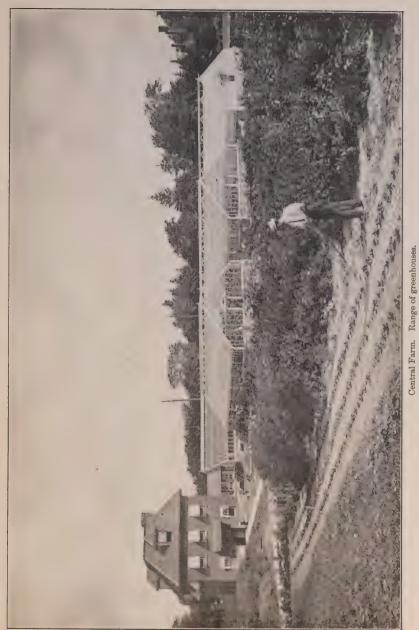
The apple crop of Canada was a disappointing one on the whole in 1914, although the crop was a medium to good one. Owing to the outbreak of the war making prospects of sales uncertain, there were few buyers at first, with the result that the price of fruit was very low, and much was left to rot in the orchards. Those who picked and stored their apples, however, were well repaid for doing so as the price steadily advanced after the picking season was over. The pear crop was light in Ontario, medium in Nova Scotia and good in British Columbia. There was considerable winter killing of the trees of this fruit in the colder parts of Ontario, as of plums also. The plum crop was light, except in British Columbia, where it was good. Where the native varieties are grown in the East there was a fair crop.

The peach crop was practically a total failure in the province of Ontario, owing to winter injury to the flower buds. The only place where there was any appreciable quantity to harvest was on the Essex peninsula.

There was a light crop of sweet cherries in Ontario, but a good crop of sour cherries in the districts where these are grown commercially. In Eastern Ontario the cherry crop was a failure. In British Columbia the crop was a medium one, and a good one in Nova Scotia.

There was a full crop of grapes, as is usual with this fruit.

The strawberry crop was below the average in Eastern Canada owing to the drought of 1913, to winter injury, spring frosts, and, in cases, to the drought of 1914. In British Columbia the crop was good.

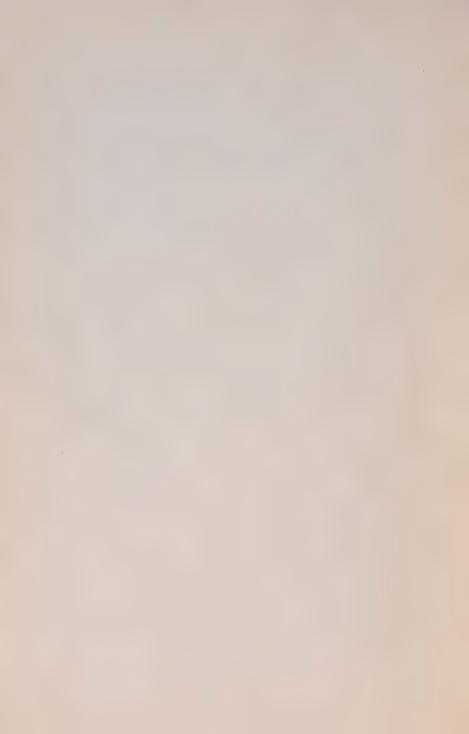


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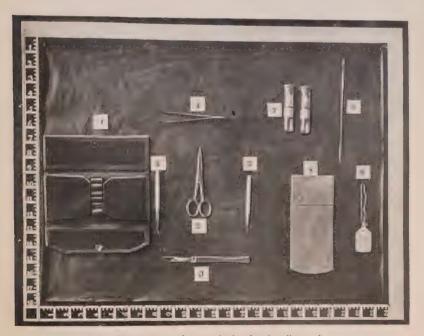


Dwarf or Cordon Apple Tree with blossoms enclosed in paper bags for crossing purposes. This dwarf type of tree is particularly suitable for hybridizing work under glass.





Apple tree with cluster of flowers enclosed in Manila-paper bags for crossing purposes. The flowers thus enclosed in bags are protected from indiscriminate pollination by insects.



Set of instruments and accessories for plant-breeding work.

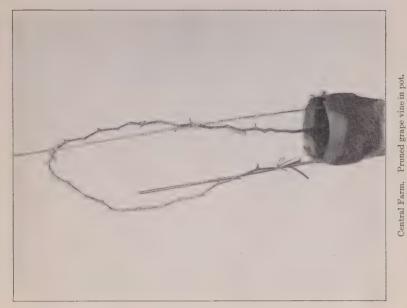
1. Case for instruments. 2. Scissors, narrow-bladed. 3. Scalpel. 4. Tweezers. 5. Needle holders with needles. 6. Camel's hair brush. 7. Small glass bottles. 8. Manila paper bags. 9. Tags, with cord attached.

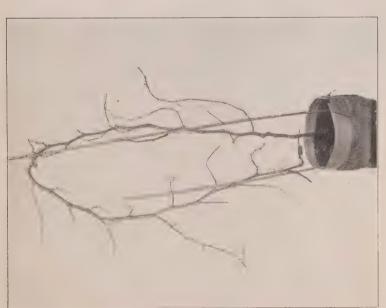




Central Farm. Grapes in pots.





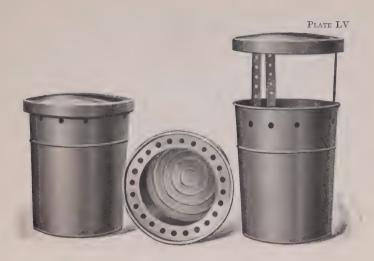


Central Farm. Unpruned grape vine in pot.



Central Farm. Rose pergola.





Central Farm. Orchard heater.



Hardy perennials: Paeonies at Charlottetown, P.E.I., 1914.





Bed of Asters, Brandon Experimental Farm.



While the early part of the season was unfavourable to vegetables, there was a good crop of most kinds of these. The potato crop was particularly good in Eastern Canada, but owing to the long continued drought in the prairie provinces the crop was light there. In British Columbia there was a good crop.

The tent caterpillars were not so injurious in Ontario and Quebec as in 1913, but were bad enough in some places. Apple Scab was not as troublesome as in some seasons.

At the Central Farm at Ottawa the very severe drought affected the fruit and vegetable crops adversely in the early part of the season, especially, but they recovered to a large extent. The months of April, May, and part of June were very dry. Vegetable seed had in some cases to be sown twice as seed of the first sowing came up so unevenly. There was a heavy drop of apples in June but a sufficient number remained on the trees to develop into a good crop of fruit practically free from disease and insect injuries. The strawberry crop, which promised very well before being affected by the drought, would have been almost a total failure if it had not been for the water applied by means of power sprayers, which kept the fruit from drying up until rain, coming on June 18 and 24, improved matters very much, resulting in one of the best crops ever obtained at the Farm.

Vegetables were a fair crop on the whole, and potatoes, which were badly affected by the drought in the early part of the season, recovered and produced a good crop.

SEEDLING FRUITS SENT TO THE HORTICULTURAL DIVISION FOR EXAMINATION, 1914-15.

There were some seedling fruits sent in for examination as usual in 1914. Partial descriptions are taken of those not considered promising and of those which are of considerable merit or are thought worthy of further test a more detailed description is made and scions are asked for of the best.

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Record Number-
        615 seedling apples from L. D. Robinson, Bridgewater, N.S.
616 "Rev. R. McEwen, Antigonish, N.S.
617 "No. 1, 2 & 3 from H. W. Roberts, Clarendon Station, N.B.
618 "from H. W. Rogers, Northampton, N.B.
619 "F. R. Taylor, Cobden, Ont.
620 "Rev. J. L. Francoeur, Casselman, Ont.
                                                   No. 1, 2, 3, from C. L. Stephens, Orillia, Ont. from E. P. Bradt, Morrisburg, Ont.
        621-623
        624
        625
                                                                           Macadam, Vankleek Hill, Ont.
                                                               J. A. Macadah, Valhatek Tith, Ont.
W. H. Reld, Waterdown, Ont.
J. F. Graham, Markdale, Ont.
Mr. Armstrong (per F. H. Grindley), Ottawa South, Ont.
C. A. Cass, L'Orignal, Ont. (See description.)
A. A. Knight, Lindsay, Ont. (See description.)
W. L. Scott, Ottawa, Ont. (See description.)
Mr. Swendfager (per E. P. Bradt, Morrisburg), near Morri
        626
                                     6.6
        627
                                     66
        628
        63.0
        6.31
                                                                Mr. Swerdfeger (per E. P. Bradt, Morrisburg), near Morrisburg,
        63.2
                                                                                  (See description.)
        633 "T. Rowan (4 seedlings) McGregor, Man.
634 seedling plum "Paxton No. 1" from F. P. Robson, Echo Drive, Ottawa, Ont. (See
                          description.)
        635 seedling red currant from O. Masser, Drayton, Ont.
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Apple Seedling from C. A. Cass, L'Orignal, Ont.—Medium size; form, oblate to roundish, eavity, deep open; stem, short, stout; basin, deep, open, wrinkled; ealyx, closed or partly open; colour, pale yellow well washed with bright crimson; seeds, medium size, acute; dots, few, white, indistinct; skin, moderately thick, tender; flesh, white tinged with red; core, medium; flavour crisp, juicy, subacid, pleasant; quality, good; season, September. Tree thought to be a seedling. Between three and four barrels taken from it. General notes, very handsome, promising, probably a Fameuse seedling.

Apple Seedling from A. A. Knight, Lindsay, Ont.—Fruit, large; form, roundish conical, very symmetrical; cavity, deep, open; stem, very short, stout; basin, deep, open, nearly smooth; calyx, open; colour, greenish yellow thinly washed with crimson; seeds, above medium, acute; dots, few, indistinct; skin, thick, tough; flesh, dull white, tender, moderately juicy, rather coarse; core, medium size, open; flavour, subacid, pleasant; quality, above medium to good; season, probably late November to February. A handsome apple and worthy of further test.

Apple Seedling from W. L. Scott, Ottawa, Ont.—Size, above medium; form, roundish to oblate conic; cavity, deep, open; stem, medium length, moderately stout; basin, open, shallow, wrinkled; calyx, closed; colour, pale greenish-yellow thinly washed and splashed and streaked with bright red; seeds, medium size, acute; dots, obscure; skin, moderately thick, tender; flesh, dull white, crisp, juicy, rather coarse; core, medium size, open; flavour, subacid, pleasant; quality, good; season, evidently September. Has an aroma. Not quite enough red on it to make it very attractive and a little coarse in the flesh, but a nice eating apple.

Apple Seedling (Seedless) from Mr. Swerdfeger, near Morrisburg, Ont.—Size, medium; form, roundish; cavity, shallow, open; stem, short, moderately stout; basin, medium depth and width, nearly smooth; calyx, open; colour, yellow, thinly washed and splashed with orange red. No seeds in two specimens received; dots, few, russet flecks; skin, medium; flesh, yellow, tender, moderately juicy; core, medium size, little cartileginous matter; subacid, little flavour; quality, medium; season, evidently October. Neither attractive nor good in quality, but interesting because seedless.

Seedling Plum called "Paxton No. 1" from F. P. Robson, Echo Drive, Ottawa, Ont.—Size, above medium; form, roundish; cavity, narrow, shallow; stem, none sent; suture, a distinct line, not depressed; apex, rounded; colour, yellow practically entirely overspread with deep red; dots, obscure; skin, thin, moderately tough; flesh, yellow, juicy; flavour, sweet, no astringency; quality, good; stone, above medium, flattened, cling; season, mid to late September. General notes, much like Cheney in appearance, but seems better in quality than Cheney; a good plum.

Seedling Red Currant received from O. Masser, Drayton, Ont.—Length of bunch, 3 inches; size of fruit, very large; colour, bright, brilliant crimson; bloom, very lustrous; skin, rather thick; flavour, slightly subacid, very little acidity; quality, good; general notes, a very large and handsome currant of good quality.

APPLES ORIGINATED IN THE HORTICULTURAL DIVISION

SEEDLING VARIETIES.

Most of the apples originated in the Horticultural Division, described in previous reports, have grown on trees raised from seed of certain varieties of apples which were naturally or open pollinated in an orchard containing many varieties. A large number of excellent sorts have fruited, of which one hundred have now been named. Of these, nine new ones are described below. These are being tested at the different Branch Farms and Stations throughout Canada where the poorest will be gradually eliminated so that in time it will be known which, if any, are better than the varieties at present on the market. It is believed that some of these seedlings are better.

Drumbo (Winter St. Lawrence Seedling).—Fruit, above medium to large in size; form, conical; cavity, deep, medium width, russeted; stem, short, stout; basin, deep, medium width, slightly wrinkled; calyx, open or partly open; colour, pale yellow well washed and splashed with dark crimson; seeds, medium size, acute; dots, few, grey, conspicuous; skin, thick, moderately tender; flesh, white, rather coarse, tender, juicy;

core, medium; flavour, subacid, pleasant; quality, good; season, late November to February or later. Resembles Winter St. Lawrence very much in outward appearance, flesh and flavour. Evidently a better keeper than Winter St. Lawrence.

Emilia (Northern Spy Seedling).—Fruit, medium size; form, roundish conical; cavity, deep, medium width; stem, short, stout; basin, deep, medium width, wrinkled; calyx, partly open; colour, greenish yellow washed and splashed with crimson; seeds, medium size, acute; dots, moderately numerous, white, distinct; skin, thick, moderately tender; flesh, dull white, crisp, juicy, tender; core, medium size; flavour, briskly subacid, pleasant; quality, good to very good; season, December probably to April. Resembles Northern Spy in colour, shape, flesh and flavour. Very much like Northern Spy.

Forerunner (McIntosh Seedling).—Fruit, medium size; form, roundish ribbed; cavity, deep, medium width; stem, medium to long, stout; basin, medium width, shallow to medium, wrinkled; calyx, closed or partly open; colour, yellow well washed with rich orange red and crimson; seeds, medium size, obtuse; dots, few, small, yellow, indistinct; bloom, very thin, pinkish; skin, moderately thick, moderately tough; flesh, yellowish with red near basin, tender, moderately juicy; core, medium, open; flavour, subacid, little flavour; quality, above medium; season, mid August to late September. Does not resemble McIntosh except in being highly perfumed.

Galton (Northern Spy Seedling).—Fruit, medium size to above; form, roundish, slightly ribbed; cavity, deep, medium width; stem, medium length, slender; basin, deep, medium width, almost smooth; calyx, closed; dots, few, white, distinct; bloom, bluish; colour, yellow well washed with deep orange red approaching crimson; predominant colour, deep orange red; flesh, yellowish with traces of red near basin, crisp, tender, juicy; core, medium size, open; seeds, medium size, obtuse; skin, moderately thick, tough; flavour, subacid, spicey, pleasant; quality, good; season, late September probably to November. Flavour somewhat like Sops of Wine, no marked resemblance to Northern Spy. Colour somewhat like Sops of Wine.

Linda (Langford Beauty Seedling).—Fruit, above medium to large size; form, roundish to oblate; cavity, medium width, shallow to medium; stem, short, stout; basin, medium depth, open, wrinkled; calyx, partly open; colour, pale yellow washed and splashed with crimson; seeds, large, acuminate; dots, few, yellow, distinct; bloom, pinkish, thin; skin, moderately thick, moderately tough; flesh, juicy; briskly subacid, aromatic; quality, good; season, November probably to February. Resembles Langford Beauty considerably in outward appearance and in flavour. An attractive looking apple.

Lipton (Northern Spy Seedling):—Fruit, medium size; form, roundish conical, ribbed; cavity, deep, open; stem, short, stout; basin, deep, medium width, wrinkled; calyx, open; colour, yellow washed and splashed with crimson; seeds, medium size, acute; dots, moderately numerous, yellow distinct; skin, moderately thick, moderately tender; flesh, yellow with traces of red, crisp, tender, juicy; core, medium; flavour, subacid, pleasant; quality, good; season, November probably to February. Coleur and shape, flesh and flavour much like Northern Spy.

Marne (Northern Spy Seedling).—Fruit, above medium to large in size; form, oblate, slightly ribbed; cavity, deep, open, russeted; stem, short, stout; basin, deep, open, nearly smooth; calyx, open; colour, yellow thinly washed and splashed with crinson; seeds, medium size, obtuse; dots, few, white, distinct; skin, thick, moderately tough; flavour, subacid, pleasant; core, medium; flesh, yellowish, crisp, tender; juicy; quality, good; season, November probably to February. Resembles Northern Spy somewhat in character of flesh and flavour.

Nome (Swayzie Seedling).—Fruit, medium size, form, oblate to roundish; cavity, open, deep, russeted; stem, short, stout; lasin, open, medium depth to shallow, smooth; calyx, open; colour, yellow washed with orange red; seeds, large, obtuse; dots, obscure; skin, moderately thick, tender; flesh, yellow, tender, moderately juicy, breaking, buttery; core, small; flavour, subacid, pleasant, high, spicey; quality, good to very good; season, October and November. Does not resemble Swayzie except in having high, spicey, flavour. Resembles Blenheim somewhat in outward appearance.

Winton (McIntosh Seedling).—Fruit, medium size; form, roundish conical; cavity, narrow, medium depth, russeted; stem, medium to long, moderately stout to stout; basin, medium depth and width, nearly smooth; calyx, open; colour, pale yellow well washed with crimson and orange; dots, moderately numerous, yellow; seeds, medium size, obtuse or acute; skin, grey, distinct, thick, tough; flesh, white, tinged with red sometimes, tender, juicy; core, medium size, open; flavour, subacid, good, McIntosh-like; quality good; season, late September, October. Does not resemble McIntosh in outward appearance, but flesh and flavour much like McIntosh. Distinctly of Fameuse group. Has perfume like the McIntosh. Attractive in appearance.

CROSS-BRED VARIETIES.

The only distinction between "Seedlings" and "Cross-bred" varieties as dealt with here is that in the latter case the varieties have been originated by artificial

pollination, both parents being known.

While the writer has not done any cross-breeding of apples during the past few years, that work now being done by Mr. A. J. Logsdail. B.S.A., assistant in charge of the Plant Breeding in the Horticultural Division, only a small proportion of the trees resulting from the work, begun by the writer in 1899, have as yet fruited, hence for several years yet these crosses will be reported upon by him. There is also the report on the work done in cross-breeding by the late Dr. Wm. Saunders, which the writer hopes to complete in future reports.

McIntosh-Lawver Crosses.—For several seasons the writer used as parents in crossing, the McIntosh and Lawver apples, reciprocal crosses being made. These parents were used because it was desired to get a longer keeping, hardy, red apple of good quality and these parents between them seemed to have all the characteristics desired. The McIntosh is a hardy red apple of very good quality but does not keep long enough. The Lawver is a red apple, only above medium in quality, and when the crossing was made, was thought to be sufficiently hardy for the purpose but since then it has not proven hardy, and a number of the crosses have proven too tender.

As descriptions have now been made of 16 varieties from this cross it seems desirable to publish the results. Of these, 10 are crosses with Lawver as the female parent

and 6 with McIntosh as the female parent.

Form

Characteristics of the fruit of sixteen varietics of apples, crosses between McIntosh and Lawver:—

	Lawver female x McIntosh male (10 crosses.) Per Cent.	(6 crosses.)
Small. Below medium. Medium. Above medium. Large.	0 10 60 30 0	0 16·7 50 33·3 0
	100	100

McIntosh is above medium in size and Lawver is rather uneven in size varying from medium to above medium.

Oblate	30 7:0	· 100
Roundish conical or roundish	0	0
Oblong	0	0
	100	100
cIntosh is roundish while Lawver is roundish to	oblate.	
College Colleg		
Green or yellow predominating	10	0
Red or crimson	50	100
Pinkish red	20	0
Orange and orange red	2:0	0
Cavity	100	100
Small	0	3.3 .4
Medium	70	- 33.3
Large	30	33 · 3
	100	100
cIntosh has a medium cavity; that of Lawver is	rather small.	
Stem .	30	0
Short	30 60	0 100
Short		
Short	60	100
Short. Medium. Long.	60 10	100
Short. Medium. Long.	60 10	100
Short. Medium. Long. Long. IcIntosh has a short stem; Lawver has a long one.	100	100
Short. Medlum. Long. IcIntosh has a short stem; Lawver has a long one. Basin Small. Medlum.	100 100 100	100
Short. Medlum. Long. CeIntosh has a short stem; Lawver has a long one. Basin Small.	100	100
Short. Medlum. Long. CIntosh has a short stem; Lawver has a long one. Basin Small. Medlum.	100 100 100	100
Short. Medium. Long. IcIntosh has a short stem; Lawver has a long one. Basin Small. Medium. Large.	0 100 0 100 0	100 0 100
Short. Medium. Long. Long. Long. Lawver has a long one. Basin Small. Medium. Large. Oth McIntosh and Lawver have small basins.	0 100 0 100 0	100 0 100
Short. Medium. Long. IcIntosh has a short stem; Lawver has a long one. Basin Small. Medium. Large.	60 10 100 100 0 100 0	100 0 100
Short. Medium. Long. IcIntosh has a short stem; Lawver has a long one. Basin Small. Medium. Large. oth McIntosh and Lawver have small basins. Colyx	60 10 100 100 100 0	100 0 100 - 0 66 · 7 33 · 3

Note.—Apples under $1\frac{1}{2}$ inches in diameter are very small; between $1\frac{1}{2}$ and $2\frac{1}{4}$ inches, small; $2\frac{1}{4}$ to $2\frac{1}{3}$ below medium; $2\frac{1}{3}$ to $2\frac{1}{3}$ inches, large; above $3\frac{1}{2}$ inches, very large.

6 GEORGE V, A. 1916

	Lawver female x McIntosh male (10 crosses.) Per Cent.	McIntosh Female x Lawver male (6 crosses.) Per Cent.
Small. Medium	0	33.3
Large	40 100	66.7
McIntosh has medium sized seeds. Lawver has	large seeds.	34
Dots		
DistinctIndistinct	40	66 · 7 33 · 3
	100	100
McIntosh and Lawver both have distinct dots.		
Skin ·		
Thin	0 8:0	0 66 · 7
Medium	20	33 · 3
	100	. 100
Both McIntosh and Lawver have thick skins		
Skin		
Tender	50	83 ·3
Medium	20	16 · 7
TOUGH		
That Terral IT I all'	100	100
Both McIntosh and Lawver have tough skins.		
Flesh		
Juicy	50 50	66 .7
22002000, 00-7, 17 17 17 17 17 17 17	100	100
Both McIntosh and Lawver have juicy flesh.	100	100
Core	4.0	10.7
Small	40 60	16·7 83·3
Large	0	0
	100	100
McIntosh has a medium and Lawver a small co	ore.	
Core		
Closed	. 40	66 .7
Open	60	33.3
	100	100
McIntosh has an open and Lawver a closed con	·e.	
Flavour		
Sweet	10	0
Mildly subacid	10	16 · 7 83 · 3
Briskly subacid	10	0
Acid	0	0
	100	100
Both McIntosh and Lawver are subacid.		0

Size,					x McIntosh male (10 crosses.)	McIntosh Female x Lawver male (6 crosses.) Per Cent.
Medium	 	 	 	 	0	16 . 7
Above medium					.50	66 . 7
Good to very good.	 	 	 	 	50	16.6
					100	100

McIntosh is very good in quality. Lawver is above medium in quality.

Season .		
August to mid September	. 0	0
Mid September to mid October	0	0
October to November	10	. 0
November to February	40	. 50
December to April	50	50
	100	100

The season of McIntosh is November to February and later, and of Lawver December to April and later.

General Resemblance or Blend of Characteristics.—In six out of ten of the crosses with Lawver as the female, no marked resemblance to either parent is recorded, and in three of the six with McIntosh as the female. Of the four varieties with Lawver as the female parent that have marked characteristics of the parent, two have distinct McIntosh flavour and two resemble McIntosh in colour. The Lawver characteristics are not very marked.

Of the six varieties with McIntosh as the female parent only two show marked resemblance to either parent in the important characteristics of colour, flesh and flavour, although in season there is a large proportion that resembles both parents. One resembles McIntosh considerably in shape, colour, and flesh, and bears some resemblance to Lawver in outward appearance. The other resembles McIntosh semewhat in flesh and flavour and Lawver somewhat in shape.

The McIntosh seedlings from open pollination have given a larger proportion with marked McIntosh characteristics than has been the case in this cross. While there are no varieties which have yet fruited which are as good as McIntosh in quality, ten of the sixteen are better than Lawver in quality, and thirteen of the sixteen are later in season than McIntosh, and most of the varieties are of high colour and attractive in appearance like the parents. Four varieties of this cross have been named, Holz and Vermac with Lawver as female parent, and Rustler and Mavis with McIntosh as female parent. The descriptions of the first three will be found in the reports for 1912 and 1913. The description of Mavis follows:—

Mavis (McIntosh female x Lawver male).—Fruit, medium to above medium in size; form, roundish, slightly ribbed; cavity, open, medium depth to shallow; stem, medium length, moderately stout to stout; basin, deep, medium width, wrinkled; calyx, open; colour, yellow washed and splashed with crimson; seeds, medium plump, obtuse; dots, obscure; bloom, light; skin, thick, tough; flesh, yellowish, crisp, tender, juicy; core, medium, open; flavour, subacid, pleasant, sprightly; quality, above medium to good; season, mid-November probably to March. Does not resemble either McIntosh or Lawver very much.

OTHER CROSSES.

Lawrer x Famcuse.—Fruits from four trees of this cross have been described. The season of all of these is later than Famcuse. Three of them are good in quality or better than Lawver. There is no marked resemblance to Famcuse in any of them.

Fameuse x Lawver.—Fruit from one tree has been described. The quality is good and the season January to late winter. Resembles Lawver somewhat in outward appearance and character of flesh. No marked resemblance to Fameuse.

Milwaukee x McIntosh.—Fruits from four trees have been described. One resembles Milwaukee very much in shape, colour, flesh and flavour. No marked resemblance to McIntosh in any of them. Quality is medium in one case and above medium in three cases. The season of three is from December to late winter and of the other November to January.

McIntosh x Milwaukee.—One was described. This resembles McIntosh in colour but not strikingly otherwise. No marked resemblance to Milwaukee except in shape. Season late, December to March.

Northern Spy x Milwaukee.—Five varieties were described. All of these show a blending of Northern Spy and Milwaukee, but none are good in quality, four being above medium and one only medium. The colour ranges from carmine to orange red. The season of four of them is from December to April, while one of them is from November to January. They have more Milwaukee than Northern Spy characteristics.

Lawver x Northern Spy.—One variety from this cross was described. It is above medium to good in quality and is a late keeping apple. The seeds are large as in Lawver, but there is no marked resemblance to either parent in other characteristics.

Northwestern Greening x Northern Spy.—One tree fruited. The season is late November to February; the quality above medium to good. The predominant colour is orange red. There is no marked resemblance to either parent except in being a late keeper.

Scott Winter x McIntosh.—One tree fruited. The fruit resembles Scott Winter in flesh and flavour, but apart from that there is no marked resemblance to either parent. Colour is pale yellow washed with bronze red on sunny side. Season, November; quality, above medium.

INDIVIDUALITY IN APPLE TREES.

In the annual report for 1903 and in several of the reports since, yields have been published from individual trees of the same varieties of apples planted at the same time and growing under apparently very similar conditions. It was shown that there was a great difference in the yields from different trees, some producing from two to three times as much as others. It was not known whether this difference in yield was due to a difference in the soil or whether, as some horticulturists believe. that each bud of an apple tree has an individuality of its own which is perpetuated by propagation. To determine, if possible, whether these differences would be continued in trees grafted from them, scions were taken from the least productive tree, the most productive tree and the tree which bore a good crop every year in a row of eighteen Wealthy apple trees. These trees were propagated in 1905, being root grafted on seedlings of the Rose of Stanstead Crab and planted out in 1909 on a uniform piece of soil. They began bearing in 1912, and in the following table will be found the yields obtained for 1912, 1913, and 1914. It will be seen that trees propagated from the heaviest bearers have so far given the largest crops. The results are interesting and would appear to indicate that the yielding habit was perpetuated. though several years' more crops are necessary before one should draw any conclusions.

YIELD of Heaviest Bearing Tree.

Record No.	Tree.	Yield 1912.	Yield 1913.	Yield 1914.
3320 	3/1 3/2 3/3 3/4 3/5 13/3 12/4	† gallon. 0 0 0 1 2 gallon. 1 1 "	0 0 0 0 2\frac{2}{4} gallons. 1 apple. \frac{1}{4} gallon.	4 gals. 7 " 4 " 8 " 7 5 " 4 "

YIELD of Heaviest and Regular Bearing Tree.

Yield 1913.	Yield 1914.
$egin{array}{cccccccccccccccccccccccccccccccccccc$	3 gallons. 7 " 3 " 3 " 10 " 5 " 9 "
15.	

YIELD from Least Productive Tree.

Record No.	Tree.	Yield 1912.	Yield 1913.	Yield 1914.
3387. 3338. 3339. 3340. 3341. 3479. 3490.	4/1 4/2 4/3 4/4 4/5 12/8 13/2	0 0 0 0 1 gallon. 0 0	\$\frac{2}{3}\$ gallon. 0 0 \$\frac{1}{2}\$ gallon. 0 0 1 gallon.	3-gallons. 5 " 6 " 3 " 5 " 9 " 4 apples. 31½ gallons.

When the scions from which trees were propagated were taken from the parent tree in 1905, the latter, which had been planted in 1896, had yielded 1031 gallons, 891 gallons, and 39 gallons, respectively.

POMOLOGY.

(M. B. DAVIS, B.S.A., Assistant in Charge.)

The work in Pomology consists mainly, at present, of the testing of different varieties of tree fruits and small fruits. Coupled with this, experiments in spraying, pruning and frost protection have been conducted. The original arrangement of the orchards has rendered cultural work impossible to any extent.

The results of these tests have been reported on from time to time, and in this report will be found the results of the variety tests in currants and raspberries to date. This past season work in frost protection, thinning, and spraying were especially featured aside from the regular routine work necessary for the care of so many varieties of fruits. The results of these investigations will be found on the following pages.

NEW OR NOT WELL KNOWN VARIETIES OF APPLES.

Many new varieties of apples are growing in the orchards at the Central Experimental Farm, consisting of those originated there, of those which have been sent in from individuals throughout Canada, and of those which have been introduced through the trade. The tree of the Delicious apple, which has been much advertised and planted in the Central and Western States, kills back at Ottawa and is evidently not going to be hardy enough for commercial purposes here. The Red June apple, which is much grown in the Southeastern States as an early apple, is a handsome apple of good quality which has fruited for several seasons and is worthy of further test. The Crimson Beauty, a very handsome early variety originated in New Brunswick, has proved very profitable in the Maritime Provinces. It is one of the earliest apples grown, being well coloured early in August. It is, however, only of medium quality, which detracts from its value. The Stayman Winesap and Rome Beauty are two good winter varieties which fruited at Ottawa in 1914. The latter has fruited for several seasons and is proving hardier than at first anticipated, but further experience is required before recommending it for commercial planting where the climate is as cold as at Ottawa. Legal Tender, a new winter variety, fruited this year, but was found to be only medium in quality. The Evelyn, a winter seedling of Wealthy, also fruited but was found not sufficiently attractive in appearance nor good enough in quality. Mitchell Red Warrior is a handsome September apple, but not good enough in quality.

A WEALTHY APPLE ORCHARD CLOSELY PLANTED.

In 1896 a small orchard of Wealthy apples was planted at the Central Experimental Farm. This orchard contained 144 trees, 10 by 10 feet apart, or at the rate of 435 trees per acre.

The idea in connection with this orchard was to ascertain whether or not the close planting of such early bearing varieties as Wealthy was a profitable undertaking. As the trees have crowded each other they have been removed from time to time, and eventually a very large number will be removed until practically the whole orchard is demolished. It is considered that by planting such orchards as these, with the idea of tearing out the trees and replanting, a greater average profit per acre can be obtained than by placing the trees farther apart and waiting for some years for all the space to be utilized. This, of course, is only practicable with such varieties as the Wealthy, Wagener, and Duchess, and trees which are comparatively small-

growing trees and bear at a young age. In removing trees the poorer yielding ones have been removed as far as possible instead of the heavier yielding trees, a record having been kept of what each tree has produced since 1899. Of the original 144 trees there are now 88 left.

The treatment of this orchard is different from the general practice, as the orchard is left in sod and the grass kept cut and allowed to remain as a mulch. It is manured once in three years.

Following will be found a statement of yields, dates, expenses and profits from the time the orchard was planted until the end of 1914:—

WEALTHY ORCHARD, 1914.				Gallons.
Fruit picked				
Windfalls				
Total				1,910.5
				Estimates
Sales of Fruit.				per acre.
40 baskets at '20\$		00	\$	25 62
145 " 225	3/2/			1.04 48
40 " 25	10			32 03
181 " 30		3.0		173 92
20 bags small apples at 50	10	00		32 03
\$	114	92	\$	368 08
				Estimates
Expenses, 1914.				per acre.
Mowing, 1 man 5 hours at '20	1	0.0	s	3 20
Lime sulphur and poison, one spraying	1	75	•	5 61
Bordeaux and poison, 3 sprays	1	6.0		5 13
Spraying 4 times	3	20		10 25
Putting on tree protectors, 1 man, 4 hours, at '20	0	80		2 56
Rent of land	-0	94		3 01
406 baskets at 5 cents with covers	20	3.0		65 02
Commission on sales	11	50		36 83
Packing fruit 52 hours at *20	10	40		33 31
Picking fruit 137 hours at '20	27	40		87 76
Total expenses	78	89	-	252 68
Net profits		03		115 40
\$	114	92	\$	368 08

WEALTHY ORCHARD 1896-1914.

Average net	profit	per acre	from	date of	planting	1896-1914
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Average n	et pront I	er acre from date of plai	Iting 1890-1914	
Net profit	s per acr	1896-1904		\$ 487 13
44	66	1905		103 13
8.6	61	1906		112 80
14	61			
* 44	41			
41	4.6			
44	61			
41	44			
81	4.4			
84	4.0			
6+	41			
Total net	profits r	r acre 1896-1914, 19 v	ears	\$ 1.719 28
			nting 1896-1914	
			fruiting, 1899-1914, 16	
			nting 1896-1914	
			46	

AUTUMN-BEARING STRAWBERRIES

A number of varieties of the autumn-bearing strawberries have been tested at Ottawa, but the best so far is the Progressive, which did very well in 1914, giving a fair crop of strewberries in the regular strawberry season and producing another fair crop in the autumn, the fruit continuing to ripen until injured by frost. The Progressive is an early ripening, attractive looking variety of medium size and good quality and has an advantage over some of the other autumn-bearing sorts in that it produces a moderate number of runners whereas most of the other sorts tested have made very few runners. Any one who desires to have strawberries in the autumn can do so by growing some of this or other varieties, but whether there will be much of a commercial demand for such fruit at a time of year when other fruits are so abundant is doubtful. On a small plot the Progressive yielded at the rate of 4,333.7 pounds per acre after July 22, when the regular strawberry season was over, and at the rate of 5,649.38 pounds up to the date of the last picking on September 25, or a total of 9,982.45 pounds per acre.

GROWING GRAPES UNDER GLASS IN POTS.

This past season witnessed the first attempt at this Farm to grow grapes under glass. As the greenhouse space available for horticultural purposes is insufficient to meet all the demands made upon it, it was considered advisable to try growing the grapes in pots instead of in a border. In this way the vines occupy the house only about eight or nine months of the year, leaving the house available the other three or four months for other crops.

The best European varieties of grapes were obtained and two-year fruiting canes were used. These were obtained from the nursery in 12-inch pots early in the fall of 1913, and stored in the cellar until March 1, 1914. At this date the vines were removed to the greenhouses, and for the first few weeks placed in any position that was vacant and not too hot.

As soon as the buds showed signs of swelling the vines were taken to the vinery and placed in their permanent position.

Two different methods of training were adopted: one in which the vines were trained to wires and led up the caves of the house, and another in which they were simply coiled around bamboo stakes inserted in the pot. This latter system is especially adapted to cases where it may be desirable to move the pots from place to place during the fruiting season. The wire system, which is more permanent, is preferable, it giving the vines more light as they are spread out over a much larger surface.

From time to time during the summer the vines were fed with liquid manure, as constant feeding is necessary in pot culture, the amount of soil being so limited. Constant watering was found necessary as the pots dried out very quickly. In these respects it is a more expensive system than growing in the border.

After the removal of the fruit in early fall, the vines were removed to a sheltered position out of doors and allowed to ripen up their wood before removing to the winter quarters. Just before removing to the cellar the vines were pruned according to the spur system, which is simply one large leading cane with the laterals pruned back to a single bud each year. The accompanying illustrations show a vine before and after pruning.

Following is a table of the varieties grown, together with the average weight of fruit taken from each vine, and also the largest yield from a single vine of each variety:—

Variety.		yield per ine.		um yield Vine.	Remarks.
	Lb.	oz.	Lb.	oz.	
Foster seedling	6	8	8	14	An early white grape of fair quality.
Buckland Sweetwater		$\frac{2}{2}$ $\frac{2}{3\frac{1}{2}}$	4	4	An early white grape of good quality.
Black Hamburgh	6	$\overline{2}$	10	$2\frac{1}{2}$	Medium early black of excellent quality.
Muscat Alexandria		25	3	0 ″	Excellent quality, white, shy setter.
Gros. Maroc	4	3 [4	9	A handsome black grape, very large, good
		2			quality.
Muscat Hamburgh	5	0	5	8	A black grape of good quality.
Mrs. Pearson	3	11/2	4	3	A white grape of good quality, but a shy
		-			setter.
Madresfield Court	3	8	4	8	Small bunches, very large handsome
					berry, fair quality but poor keeper.
Black Alicante	4 2	131	6	8	Good quality black grape, late.
Gros. Coleman	2	8"	4	12	Poor quality, large, handsome, very
					watery.
Frankenthal	7	9	7	14	Good quality, black, same as Muscat
]		1		Hamburgh.
Royal Muscadine	2	0	2	0	Small white grape, poor in quality and
_					_ yield.
Alnwick Seedling	1	0	1	0	Fair quality, poor setter.
Grizzly Frontignon	2	9	3	10	Poor quality, not recommended.
Mrs. Pince	1 2 1 2	0	1	0	,
Lady Down Seedling	2	$7\frac{1}{2}$	2	8	
Prince of Wales	4	η 0 γ	4	_ 12	A very large berry, handsome large bunch, good quality, black grape, promising.
	1				But duming), start Braho, bramond,

The total yield from the whole house which contained fifty vines was 187 pounds 4½ ounces, or an average of 3 pounds 8½ ounces per vine.

Frankenthal gave twice this amount as an average per vine, and Foster Seedling and Black Hamburgh gave nearly twice this amount.

It may be added that it has been decided to discard Grizzly Frontignon, and Royal Muscadine owing to poor quality, appearance, and productiveness

FARMERS' MONTHLY EXPENSE SHEETS.

Attention is again called to the monthly expense sheets issued free by this Division, and which were just prepared last season, reference having been made to them in the 1913 report.

Since that time over one thousand of these have been distributed to persons requesting them, but it is hoped that a much larger number of farmers will take an interest in the matter, and make an attempt to ascertain the cost of production of their different crops. These sheets are simple and handy, and can be readily understood by any person. They will be sent free on application to the Dominion Horticulturist.

THINNING EXPERIMENTS WITH WEALTHY APPLES, 1914.

A thinning experiment on a small scale was conducted with 12 Wealthy apple trees, three being left unthinned, three having 19 per cent of the fruit removed, three having 25.9 per cent removed, and three having 30.1 per cent removed.

The apples were removed from the trees about the time that they were the size of large walnuts and every apple removed was counted.

At the time of harvesting, all apples harvested from these trees were also counted. In this way a record of the total number of apples originally on the trees was obtained.

In the packing, the apples were graded into fancy, No. 1, No. 2, No. 3 and culls, and were sold on the market as such, a record being kept of the pack-out from each plot, and of the returns obtained in the sale of the different grades of fruit.

The results of the experiment appear as follows:-

TABLE No. 1 .- Pack out results in 11-quart Baskets.

Plot,	Fancy.	No. 1.	No. 2.	No. 3.	Culls.	Drops.	Total No. of baskets.
Thinned 25 9 per cent. 1	8 2	10 18 5 15	13 - 4 - 5 - 11	13.5 4.5 12: 16:	3 3 3 3.5	41 32 20 65 5	82·5 69·5 47· 111

Table No. 2.—The above results expressed as percentages.

				1			
Plot.	Fancy.	No. 1.	No. 2.	No. 3.	Culls.	Drops.	
				M-84-11-1			
Thinned 25.9 per. cent	2·4 11·5	12.1	15.7 5.7	16.3	3·6 4·3	49·6 46·	
30°1 n	4.	10 6	10.6	24.6	6.3	42.5	
Not thinned	0	13.5	9.9	14.4	3.1	59.	

It will be noted that the greatest percentage of No. 1 and Fancy apples came from the plot thinned 30.1 per cent, while the total Fancy and No. 1 apples from the other two thinned plots is about equal and very little in excess of the unthinned plot. The percentage of culls, it will be seen, remains about the same for all four plots.

Now in order to compare the actual merits of the thinned and unthinned plots, it will be necessary to determine what the results from the unthinned plot would have been, had it been thinned. By actual count the unthinned plot produced 11,786 apples, and 39 of these were required to fill a gallon, while from the plot thinned 30.1 per cent, only 29 apples were required to fill a gallon.

Now had the unthinned plot been thinned, 30.1 per cent of the apples would have been removed, which would have left 8,239 apples to be harvested in the autumn.

The size of the apples would then have increased to the same sizes as those from the 30.1 per cent thinned plot, or to 29 per gallon.

This would have given yield in gallons of $8,239 \div 29$, or 284 gallons, whereas the actual yield was 300 gallons, so that there was a decrease in total yield of 16 gallons, or 5.3 per cent.

This loss due to decrease in yield, however, may have been offset by the increased value of the apples resulting from thinning. This can be arrived at by working out the pack-out from the above theoretical yield, using the percentage actually obtained from the 30.1 per cent plot.

These pack-out results show that the 30.1 per cent thinned plot gave:-

11.51	 	 	 	per cent. Fancy Apples.
25.8991	 	 	 	" No. 1.
5.7553	 	 	 	. " No. 2.

Referring now to table No. 1 and using these percentages on the crop from the unthinned trees it is found that had they been thinned to 30.1 per cent the total crop would have been 103 11-quart baskets instead of 111 as was the actual case. The pack-out would have been as follows:—

11°8 baskets 26°6 " 5°8 " 6°6 " 51°9 "	fancy			 	* 66	\$ 3 54 6 65 1 30 1 32 2 59
	Total					\$ 15 40
Instead of 1	baskets No. 1					\$ 3 75
1	1 " No. 2.			 	. 44	2 47
1	6 " No. 3.			 		3 20
6	9 " Culls	and dro	ops	 	. 16	3 45
					-	
	with a total	value	of	 		\$ 12 87

This gave a gain of \$2.53 for the three trees in this plot. Against this is the cost of thinning, which amounted to \$1.05 in this plot, leaving a net gain of \$1.48 for the three trees. This figuring out for an acre with 45 trees on it would mean a net gain of \$22.20 due to thinning.

Working on these same principles it was found that the results of the other three plots appear as follows:—

When 20.1 per cent of the fruit was removed the gain was 20 cents, but when cost of thinning was considered this turns to a net loss of 70 cents, or \$10.50 per

When 16.1 per cent of the fruit was removed a gain of 69 cents resulted, or a net loss of 16 cents, when cost of thinning was considered. This equals a loss of \$2.40 per acre.

It will be seen from these results that only in one instance did thinning pay, but in that one case the profit was worth while. From these results it appears that thinning may or may not pay, depending upon the amount of fruit removed, and also upon conditions over which there is no control. In every case uniform trees were selected as much as possible.

CURRANTS.

Following will be found a list of the red, white and black currants tested at this Farm. The average yields given are the result of an 11-year test, except in those cases where a special note is made to the contrary.

During the winter of 1911, which was exceptionally severe for bush fruits, considerable winter killing was evidenced, and a number of varieties were almost entirely killed back. This gave an especially good opportunity to note the hardy varieties, and the results of these observations are given in a separate column headed "Winter Injury in 1911."

- 6 GEORGE V, A. 1916

ELEVEN Years Test of Red Currant yields based on six bushes of each variety. 1904-14.

Variety.	Yield _f	Winter Injury During 1911.
1 London Red. 2 Red Grape. 3 Red Dutch 4 Simcoe King. 5 Cumberland Red. 6 Rankins Red. 7 Long Bunched Holland. 8 Knight Large. 9 New Red Dutch. 10 Franco German. 11 R.bes Striatum. 12 Raby Castle. 13 Moore Seedling. 14 Victoria Red. 15 Pomona. 16 Hed English. 17 Greenfield Red 18 La Conde. 19 Large Red. 20 Wentworth Seedling. 21 Goliath. 22 Ringens. 21 Goliath. 22 Ringens. 23 Champagne Red.	1b. oz. 33 7 32 14 32 14 32 12 28 7 28 6 28 0 27 8 26 14 26 7 25 2 24 2 24 0 23 7 21 9 21 9 21 9 21 19 20 10 19 14 19 3, 16 12 15 13	Wintered well. """ Severely injured. Slightly injured. Wintered well. """ """ """ """ """ """ """ """ """
24 Wilder 25 De La Rochepoze. 26 Benwell 27 Early Scarlet. 28 Versaillaise. 29 Fertile d'Angers. 70 Fay Prolific. 31 Admirable. 32 Defiance.	14 13 14 2 13 0 11 15 9 12 7 0 6 0 3 14 3 1	10% injured. Wintered well. 15% injured. Wintered well. 50% injured. Nearly all killed to { round. Killed to ground.

Average yield Red Currants for six years only, six bushes each variety, 1909-14.

Variety.	Yield.	Winter Injury During 1911.		
1 London Market	Lb. Oz. 29 11 20 12 15 5 15 0 13 7 12 2 9 15 6 9 4 13 4 12 2 12 1 14	Wintered well. " 25% injured. 35-50% injury. 50% injuryd. 15% injury. Wintered well.		

ELEVEN Years Test of White Currant, yields based on six bushes of each variety, 1904-14.

Variety.	Yi	eld.	Winter Injury during 1911.		
	Lb.	Oz.			
White Cherry	24	12	Wintered well.		
White Imperial	18	15	11 11		
Large White	18	13	25 per cent killed.		
white Dutch	18	10	5 per cent injured.		
Eyatts Nova	17	11	15 " "		
White Kaiser	16	15	Wintered well.		
Verrieres White	16	3	11 11		
Large White Brandenburg	15	3 5 1	11 11		
Ulimax White	15		Injured slightly.		
White Grape	14	10	Wintered well.		
White Pearl	14	6	15% injured.		
Champagne White	10	15	25% "		
white Gondouin	10	10	Wintered well.		
Wentworth Leviathan	9	1	5% injured.		
Frauendorfer	7	12 4 yrs.	25% " Wintered well.		

ELEVEN Years Test of Black Currants, yields based on six bushes of each variety, 1904-14.

Variety.	Yie	eld.	Winter Injury During 1911.
1 Kerry. 2 Ontario 3 Ogden. 4 Magnus 5 Saunders 6 Tojsy 7 Eagle. 8 Black Grape. 9 Clipper. 0 Beauty. 1 Eclipse.	Lb. 24 23 23 21 20 19 19 18 17	Oz. 6 14 14 0 2 13 1 2 8 7	Wintered well . Five per cent injured. Wintered well. " " " " " " "
2 Clamax 3 Merveille de la Gironde. 4 Buddenborgs. 5 Ethel 6 Collins Prolific 7 Victoria Black 8 Trince of Wales 9 Bang Up	17 17 16 15 15 14 14	3 2 12 6 0 6 5	Ten per cent injured. Wintered well. " " " " " " " " " " " " " " " " " "
Lee Prolific. Prince Nortom Success Black Champion Orton Black Naples	14 13 12 10 9 8	0 14 14 1 7	Wintered well. Wintered fairly well. Ten per cent injury. Twenty-five per cent injured.

RASPBERRIES. .

Variety testing has been the main feature of the work in raspberries for the past number of years. As records of yields are available for a long period, reliable information concerning the bearing qualities of the older varieties is here given.

The first table shows the average yield of the best thirty varieties of raspberries for a period of nine years, these being the results from two different plantations.

It is worthy of note that the six heaviest yielders of this period are all varieties originated in Canada. Herbert, which heads the list for the second time, thus easily holding its own, is a chance seedling of Mr. R. B. Whyte, of Ottawa; the next five, Shinn, Brighton, Count, Sir John, and Muriel are all varieties organized by the late Dr. Wm. Saunders.

Some forty-three varieties of English and American origin figured in this eight year test.

Average total yield for Nine Years of the best producing twenty-five varieties, yield of twelve bushes, 1904-7 and 1910-14.

Number	Variety.	Yield.		
		Lb.	Oz.	
12 2.34 4.56 67 89 11011 12113 1415 1617 1820 221222 22324 225228 22627 22930	Herbert Shinn Brighton Count Sir John Muriel Kenyon Seedling Henry Cardinal Craig Deacon Lorne Bigger Seedling Knevetts Reliunce Turner Velson Caroline Calonine Caroline Calonine Caroline Calonine Caroline Calonine Caroline Calonine Caroline Calonine Caroline Calonine Calo	30 24 22 21 11 19 17 16 16 16 14 13 12 12 12 12 12 11 10 9 9 8 8 8 7 7	10 15 15 15 13 15 0 0 3 12 11 8 5 1 1 1 1 1 6 0 6 1 1 1 6 6 6 1 1 1 6 6 6 6	

The foregoing table as previously stated covers a period of nine years. So as to get an idea as to how some of the newer varieties behave, there is appended below a table giving the average total yield of the best thirty varieties for a period of five years, including the yield of 1914, which is the last yield that will be recorded from that particular plantation.

Comparing this test with the first one, it will be seen that the best ten in each case are almost the same varieties, excepting that Louboro, Seedling No. 1 from C. P. Newman and Eaton, three newer varieties, have displaced Kenyon Seedling, Cardinal,

and Craig. Of these three new varieties, Seedling No. 1 from C. P. Newman is very promising. It is a large firm bright coloured berry of good quality, apparently hardy and quite productive. Eaton, though hardy and productive, is crumbly and thus poor for shipping.

Average total yield of Raspberries for five years ending 1914.

Number	Variety.	Yi	eld.
1	Herbert	lb.	Oz.
3	Count. Shinn.	20 20 18	15 13 1
4 5	Sir John	17 17	14 12
6	Seedling No. 1 from C. P. Newman. Brighton.	16 16	15 13
8 9	Muriel. Henry	15 15	3
$10 \dots 11 \dots 12 \dots 12 \dots 12 \dots 12 \dots 12 \dots 12 \dots $	Eaton #dighland Hardy Dr. Reider	14 13	12 0
13 14	Knevetts. Rancocas.	12 12 11	15 10 13
15 16	Mariative	11 11	11
18	Cardinal June	11 11	4
20	Ruby Brandywine Columbian	10 10 10	14 14 9
32	Bigger Seedlin 7 St. Regis	10 10	8
25	Caroline.	1.0 1.0	3
27	Lorne Heebner Marlboro	10	2 12
9	Sunbeam Cuthbert	8 8 8	15 10 8

EARLY RASPBERRIES.

The following table gives the yields of seventeen varieties for the first ten days of picking. This is an average for five seasons. As earliness is an important point, it was decided to adopt this method of arranging the order of merit for this point, rather than depend on the date of the first ripe fruit. A variety, although it may show ripe fruit before another, may not give as large a yield over say a ten-day period, which upon examining the market records, appears to be about the period of time that the price on early fruit is maintained.

This table also gives the average number of days that fruit is picked from the different varieties.

List of best varieties of raspberries for earliness and productiveness. Five years average (1910 to 1914). Earliness based on yields of the first ten days of the season.

Variety.	Average Yield for 1st 10 Days.	Length of Season.
1 Count	Lb. Oz. 10 14 1 10 2 3 8 15 6 7 12 3 7 7.85 7 4 45 6 7 4 6 6 9 5 11 4 5 8 25 5 4 9 5 1 45	Days. 26 25 28 23 20 25 19 23 26 25 24 24
3 Marlative 4 June 5 Louboro. 6 Red Antwerp. 7 St. Regis	4 15·19 4 13·3 4 13 4 5·15 4 2·5	20 20 24 21 89

[&]quot;St. Regis" is a so-called everbearing variety. In 1914 the last picking was on October 6.

PROTECTION AGAINST FROST, BY THE USE OF FIRE POTS.

The question of protection against late spring frosts is one that has had the attention of nearly every grower of fruits and vegetables which are subject to its rayages.

Of the various methods devised, only one seems worthy of consideration, and that is the method of raising the temperature of the surrounding air by the use of orchard heaters or fire pots.

TYPE OF HEATER USED.

Although there are many types of heaters on the market, only one was used at the Central Farm, owing to the inability of several manufacturers to supply their heaters at short notice. The type used is known as the Competition Heater, and is one of the simplest forms on the market. The accompanying illustration will explain its simple construction. It has the great advantage of being able to be stored in a comparatively small place, and furthermore there is no mechanical device to get out

of order. Referring to the illustration, it will be noticed that the heater in question consists of an ordinary pail of sheet iron with perforations around the top to allow of a draught of air, there being also a perforated rim which fits into the heater to assist in this draught. The heaters are supplied with a cover to be used during bad weather. On the right of the illustration will be noticed a heater with a reflector attached. This attachment was for the purpose of reflecting the heat downwards, and was designed for use with ground crops. The theory was that by reflecting the heat toward the ground, it would be easier to raise the ground temperature. But this did not work out in practice, as practically no effect was felt at a greater distance than three or four feet from the heater. Furthermore, when used in strawberries, the heat in the vicinity of the heater was so great on the ground that the plants were invariably burned, so that from the data on hand it would appear that the reflector is not a success.

FUEL.

The fuel used in these heaters is what is known as fuel oil, and can be procured from any of the leading oil companies of Canada. It has a specific gravity of about .85 and a flashing point of .275. In tank car lots it may be purchased at 6 cents per gallon or less, f.o.b. Ottawa, and in barrel lots at eleven cents, f.o.b. Ottawa.

NUMBER OF HEATERS PER ACRE.

The number of heaters required per acre will depend upon the degree of frost to combat. For ordinary purposes one hundred heaters per acre should be ample, as this number of heaters is sufficient to raise the temperature of the surrounding air eight degrees on the worst night and ten degrees on the average frosty night, a great deal depending upon the wind. The actual ground temperature, however, may not be raised much above freezing point, especially when the frost is of long duration. The difference in the temperature on the ground and just a few inches above the ground is very marked, so if the actual ground temperature has to be raised considerably a larger number of heaters than one hundred would be required for an acre.

METHOD OF DISTRIBUTING THE HEATERS.

The method of distributing the heaters throughout the area to be heated will depend on the quarter from which the wind is blowing. Generally on our frosty nights, the wind comes from between the north and west, so that in this case, there should be more heaters on the north and west sides than on the other sides. It will be readily understood why this is done, as the wind would blow the heat over the rest of the area. If, on the other hand, the wind was from the east and the larger number of heaters were on the west side of the area, the heat would be driven from the western side to a point outside of the area to be heated. It is not a very long task to shift the pots, just before lighting, to suit the night in question, but it is very important to have the larger number of pots well to the windward of the area requiring heating.

The pots should be filled and placed in the field sometime before frost is expected so that everything will be in readiness at a moment's notice. As a good strong cover is supplied with each heater, there will be no danger of rain getting in to dilute the oil, if the heaters are kept covered while not in use.

LIGHTING AND CARE OF HEATERS WHILE IN USE.

As the oil used in these heaters is very crude and unrefined, it has a very high flashing point, or in other words will not ignite readily. Hence, it is necessary to employ some other means of lighting the pots, than by merely applying a lighted match or torch. If gasoline, which is a very combustible product, is applied to the surface of the liquid in the heaters, and a lighted match or torch then applied, the gasoline will ignite and burn, and by the time it has burned out, it will have raised the temperature of the oil to its flashing point and ignition will take place. In experiments, at this Station, it has been found that only a few drops of gasoline are necessary for this purpose, two quarts is ample for one acre or 100 heaters. In lighting up, the method employed is somewhat as follows:—

First, have all the covers removed from the heaters, which will only take a few minutes. After the covers have been removed, one man starts with a bottle of gasoline (see figure 2) and drops a few drops of the gasoline in the heaters. He is immediately followed by a second man with a lighted torch, who applies the torch to the surface of the pot. In this manner the task of lighting is carried out very quickly. One thing to remember is, do not apply the gasoline until just before ready to light, for it is so volatile that the small amount used will readily evaporate from the comparatively large surface. The torch used may be made out of any stick with bagging wrapped around and tied with wire, then soaked in gasoline or kerosene. Another point worthy of mention is that kerosene or coal oil will not take the place of gasoline, in lighting up. Kerosene will not light quickly and is consequently of no use for that purpose.

REFILLING.

Whether or not the heaters require to be refilled while frost is in duration, will depend upon the length of the frost period. The heaters hold six imperial quarts and will burn anywhere from six to nine hours. Ordinarily this is ample to carry a crop through the worst night we would expect in spring, as at that time of year frosts only last about four hours. If, however, it becomes necessary to refill, it can be safely carried out without extinguishing the flame. The oil is of such a non-combustible nature that it will not explode or cause any harm to the operator when poured into a burning heater. At first there will be a spluttering due to the cold oil coming in contact with the hot pot, but if a long snouted can is used such as is shown in figure No. 3 no danger will appear. It is not advisable, however, to apply the oil from an ordinary bucket, for in this operation the operator may have to put his face too close to the heater and thus may receive burns from the hot spluttering oil. Allowance should always be made for refilling, and barrels of oil should be distributed throughout the area to be heated so as to facilitate the operation of refilling as much as possible. With the oil distributed in barrels at different points, two men can, with a ten-quart long snouted can, care for from two to three hundred heaters on the worst night and keep same properly filled.

EXTINGUISHING.

The fire or flame in the heaters may readily be extinguished by simply placing the cover on the heater. The flame may smoulder for a few minutes, but will soon be extinguished when the cover is placed in position.

SOME RESULTS FROM USING FIRE POTS.

As no frosts were experienced in the late spring, it was decided to test out these orchard heaters in the early fall. So on the night of September 28 the heaters were lighted. On this night, the frost came very early and the thermometer had fallen to 22 degrees before there was any person in the vicinity of the alarm, as all the men were home to their suppers. The heaters were lighted, however, at 8.35 p.m., and at this time the temperature was 30 degrees Fahr, on the ground and 32 degrees Fahr. 14 mehes above the ground. It might be added that thermometers were placed both inside and outside of the heated area. These thermometers were placed one on the

ground and the other 14 inches above the ground, four thermometers being used for the two areas. These thermometers had all been previously tested and corrected. The thermometers inside the heated area were placed as far from any of the heaters as it was possible to place them. Keadings both inside and out were taken at different intervals throughout the night, and the results are recorded below.

Besides depending on the thermometers, young tomato plants from the greenhouse were placed, some inside and some outside the heated area. Next day it was observed that those plants which had been inside the heated area were not injured at all, while those plants which had been outside were entirely killed by frost. As before stated, the heaters were lighted at 8.35 p.m., when the ground temperature was 30 degrees and the temperature 14 inches above the ground was 32 degrees F. At 9.05 p.m., just half an hour after lighting, the temperature inside the heated area had risen to 32 degrees on the ground and 34 degrees 14 inches above the ground, while the temperature outside was 28 degrees F. on the ground and 30 degrees F. 14 inches above the ground. This shows a rise of 4 degrees F. in temperature due to the effect of the heaters.

The following table gives the temperatures both inside and outside the heated area at different hours during the night:—

	9.05 p.m.		10.30 p.m.		1.30 a.m.		3 a.m.		5.45 a.m.	
	Ground.	14 in. above	Ground.	14 in. above.	Ground.	14 in. above.	Ground.	14 in, above.	Ground.	14 in. above.
	0	0	۰	•	0	0	0	0	0	۰
Heated area	32 F.	34 F.	33 F.	36 F.	32 F.	34 F.	31 F.	·34 F.	32 F.	34 F.
Outside area	28 F.	30 F.	32 F.	34 F.	28 F.	30 F.	24 F.	28 F.	26 F.	29 F.

It will be noted that until 1.30 a.m. the heated area had a minimum temperature of 32 degrees F. against a minimum temperature of 28 degrees F for the outside area. After 1.30, of course, the temperature on the ground, inside the heated area, dropped to 31 degrees F. or 1 degree below freezing point. But it must be remembered that this was some 7 degrees higher than outside the heated area, and that such a frost as this rarely occurs, if ever, during the spring. It is also well to note that at 14 inches alove the ground, the minimum temperature inside the heated area was 34 degrees F. as against 28 degrees F. for the unheated area.

This record, coupled with the fact that the tomatoes in the heated area came through uninjured, is fairly good evidence that the heaters are a practical method of fighting frost.

Whether or not it is an economical method, will depend to a very large extent on the margin of profit of the crop in question, although it must be borne in mind that a frost may mean the difference between absolute failure and success and even if the cost of saving the crop eats up the profit, the loss may not be as great as it otherwise would have been had it been allowed to be totally destroyed by frost. The following estimate of plant and operating expenses seems fair:

Plant

= *******	
Cost of 100 heaters at 31 cents	\$ 31 00 30 00
Total for plant Operating Expenses per Acre.	\$ 61 00
The state of the s	
Placing and filling 100 heaters	\$ 1 25
Tending 100 heaters, 5 hours, 2 men at 20	 2 00
Fuel (Maximum consumption see below)	12 50
Gasolene for lighting	0 20
	 0 20
Total	\$ 15 95

Note.—The amount of fuel used may vary from 4 quarts per $4\frac{1}{2}$ hours to 4 quarts per 7 hours, or in cost from \$1.60 to \$2.50 per acre per hour, depending on the night in question. The frost alarm will also serve for any number of acres so the cost of plant per acre would gradually be reduced.

A FROST ALARM SYSTEM.

Many nights during early spring threaten frosts, which do not actually arrive, or if they do, only come in local areas. On this account, it is very difficult for any person to foretell whether a frost will actually come or not. So that the only way to be on the safe side would be for the grower to sit up and keep watch. As this is a very arduous task, it is quite essential that a frost fighting equipment be supplemented by the addition of a frost alarm. The frost alarm thermometers are very accurate and reliable, and are very simple in construction.

By referring to Figure No. 4 one of these alarm thermometers may be seen. "A" shows the thermometer and "B" shows the battery box and bell. The working is very simple. The thermometer is placed on a post a distance of about six or eight inches from the ground and the battery box and bell are placed in the caretaker's bedroom. The thermometer should be placed in a cold part of the farm where frosts generally strike, and it should not be more than 900 feet from the battery box. The two wires are then led from the battery to the thermometer.

The alarm thermometer is a specially-made instrument with a fine platinum wire fused into the bore of the tube, connecting with the mercury column at 32° F. or any other one permanent point desired. A second wire, touching the mercury at a point below the other, completes a circuit, which is broken the instant the mercury drops below the designated danger point—the permanent point referred to above. A non-sparking special relay battery attachment causes a bell to ring at practically any distance from the thermometer itself, the moment the circuit is broken. Until the alarm rings the danger is not imminent and all unnecessary expense may be spared.

A TEST OF DIFFERENT ARSENATES OF LEAD.

A number of brands of arsenate of lead, both in the powdered and in the dry form were tested as to adhesive qualities and injurious effect upon the foliage. The same were also analyzed by the Chemical Division, and using these analyses as data, it is purported to show that often a lead costing considerably more than another is really the cheaper, on account of its greater percentage of arsenic.

The active ingredient of arsenate of lead is arsenic and upon the amount of this present depends the value of the lead in question, provided it possesses good adhesive qualities and contains less than 1 per cent of soluble arsenic, which, if present in larger quantities, is liable to cause burning of the foliage. The relative adhesiveness of the different brands was determined by what remained on the foliage after each rain.

Following is a list of the arsenates of lead tested with the analysis of each and its value as to adhesive qualities appended.

Name of Lead.	Per cent of Arsenic Oxide.	Per cent free Arsenic.	Adhesive value.
Sherwin Williams' N. P. Paste Sherwin Williams' Dry Arsenate Grasselli's Paste Canada Paint Company's Paste Swift's Arsenate Paste Canada Paint Company's Powder Vreeland Chemical Company's Electro Paste Vreeland Chemical Company's Electro Dry Bowker's Paste Thomsen's Standard Paste Thomsen's Triplumbie Paste Thomsen's Triplumbie Paste Thomsen's Dry Arsenate	15 · 21 31 · 31 16 · 44 14 · 35 15 · 10 32 · 18 17 · 15 31 · 62 19 · 88 18 · 19 12 · 25 30 · 76	48 89 46 59 37 777 18 15 53 25 51	60 70 75 75 50 85 40 30 45 65 85

In no instance was the percentage of soluble arsenic as great as 1 per cent and no burning of the foliage resulted in any case although the lead was applied at the rate of 10 pounds to 40 gallons of water. Notes were taken on the foliage from time to time, and after each rain special attention was paid to the amount of lead remaining on the leaves. It will be noted from the foregoing table that the dry lead of the Canada Paint Company and the Thomsen Chemical Company, together with Thomsen's triplumbic lead, are much more adhesive than the others. The Canada Paint Company's powder is considerably more adhesive than their paste, from the same product. The powdered lead appeared to mix with water better, sceming to become more finely divided and thus more sticky. As the value of an insecticide depends to a great extent on its ability to adhere to the leaf for a long time, these notes on adhesive lead was adopted as a standard and in taking the foliage notes all others were compared with it.

With regard to the value of the different leads on the market, it may be added that purchasers should buy such products on the unit basis, that is, they should ascertain the percentage of arsenic oxide which will be given by the manufacturers, and find out just how much they are paying for each percentage of arsenic present. For instance, comparing the Canada Paint Company's paste lead with the Canada Paint Company's dry lead, it is found that the former contains 14.35 per cent of arsenic oxide, the latter 32.18 per cent or more than twice as much. The dry arsenate was quoted at \$19 per hundred, while the paste was quoted at \$9.75 per hundred. In the case of the paste lead, the purchaser was paying almost 0.68 cent for each per cent of arsenic oxide present, while in the case of the dry form he was paying only a fraction over 0.59 cent for the same thing, a saving of practically 0.9 cent, or 13 per cent. That is, the purchaser could have afforded to pay 13 per cent more for the dry lead than for the paste lead, considering the percentage of arsenic oxide only, but added to this saving is the fact that the freight on the dry lead, to obtain the same quantity of arsenic, is less than on the paste, for in the latter instance freight is paid on water. The powdered form also has the advantage of being better in adhesive qualities.

VEGETABLE GARDENING.

C. F. W. DREHER, B.S.A., Assistant in Charge:

As in the past, the main work of this subdivision has been along the line of variety testing, although a few cultural experiments have been conducted where it was possible to find room for the same.

Probably the most striking new feature of the work in connection with vegetables has been the completion of the new greenhouses, where considerable attention is to be given to the growing of some of the more important crops. Elsewhere in this report will be found the result of some variety tests of tomatoes, also one season's results of different methods of pruning and training the vines.

POTATOES.

Notwithstanding the dry weather in the early part of the season and some injury from rhizoctonia, owing to favourable conditions in the latter part of the summer there was a good crop of some varieties, though the field on the whole was only medium. In the following table is given a list of the best thirty varieties for 1914. In connection with this is added a list of the best twelve varieties for 1912, 1913, and 1914.

The seed of these varieties was obtained from outside sources in 1912, and since that date has been grown and saved at this Station.

According to the results obtained from past experiments imported seed has given better results than seed grown at this Station. The imported seed, of course, came from sections of the country more adapted to potato growing than Ottawa, so that in these special potato districts the same results with imported seed would not probably hold true.

This result with imported seed is attributed to the fact that the vines in this climate dry up long before digging, or long before frost, whereas in such places as the Maritime Provinces the vines remain green till killed by frost, tubers developed under such conditions having stronger vitality than those prematurely ripened by hot dry weather.

Referring to the two tests following, it may be noted that Moreton leads in both.

EXPERIMENTS WITH IMMATURE SEED.

In bulletin No. 4?, page 18, of this Farm, experiments with immature potato seed are referred to. This past season experiments to learn more about the value of immature seed were continued.

SEED SELECTION.

Experiments in seed selection were again made this season. The system adopted was to select the best ten hills from a row 66 feet long. These hills were selected according to yield at the time of digging. The yield of these 10 selected hills was then recorded as well as the yield from the remaining part of the row. Next year it is intended to plant equal quantities of seed from both the selected and the unselected

hills, growing them under the same conditions, side by side. In this way any benefit from the selection can be accurately determined.

POTATOES, Thirty Best Yielding Varieties, 1914.

Variety.	Marketable. Bush. Lb.	'Unmarketable. Bush Lb.
Moreton	528 00	. 70 22
Brydon	442 12	61 36
New Dearborn	435 36	13 12
Warrior (C.E.F.)	431 12	52 48
Davies Warrior (O.A.C.)	404 48	46 12
Conquering Hero	400 24	17 36
Long Keeper	396 00	
Dalmeny Regent	391 36	127 36
Manistee	387 12	88 24
Dalmeny Hero	382 48	88 00
New Chieftain	378 24	57 12
Dobbie Prolific	369 36	26 24
Superlative	360 48	35 12
The Scott	360 48	41 48
X from Mrs. Grace	352 00	52 48
White City	347 36	48 24
Aroostook Wonder	338 48	13 12
McIntyre		61 36
Acquisition	330 00	61 36
Scottish Triumph	319 00	4.6 12
New Keystone	316 48	39 36
Royalty	316 48	70 24
Sir Walter Raleigh		39 36
Todd Wonder		66 00
Brydon Beauty	3.03 36	66 00
Gold Coin	294 48	44 00
Empire State	294 48	48 24
Snow	294 48	52 48
Table Talk (Lacombe)		154 00
Jeannie Dean	286 00	57 12

Twelve Most Productive Varieties of Potatoes, 1912-13-14. Three year average

	Marketable Bush, Lb.	
Moreton	. 334 24	52 4
Empire State(48 24
Dalmeny Hero	. 3274 -	105 36
Brydon /		57 54
Conquering Hero	. 314 36	80 48
Dalmeny Regent	. 305 4 '	90 54
Clyde	. 303 36	44 00
Houlton Rose	. 299 12	56 48
Green Mountain		55 42
Table Talk	. 296 12	68 54
Sir Walter Raleigh	. 288 54	27 6
Manistee	. 288 54	40 18

GREEN PEAS.

The variety test of peas is divided into separate sections. First, there are the 30-foot rows, which are allowed to ripen for seed and on which careful notes are taken for each variety. These rows, besides serving for seed production, are useful for comparison of the new varieties which, if they do not show promising results in 30-foot rows, are not grown in the 100-foot rows, which are picked for green use.

The 100-foot rows are really the final testing place of the varieties. The seed is sown 1 inch apart in rows 4 feet apart, and careful notes are taken throughout the summer on the yield and other notable points. Following is the result of the 1914 variety test in the 100-foot rows for green use.

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The varieties are divided into early, medium early, and late. The varieties are all classified according to earliness and yield, not according to yield alone. Notes on the number of days from date of planting to first picking, on percentage of crop picked at first picking, number of pickings made, length of straw and length of pod are appended.

These notes are especially interesting and useful for a person wishing to obtain certain features in a pea, besides yield. For instance, with reference to the number of pickings, it will be noted that Extra Early Pioneer, which gives a yield of 25 pounds and 2 ounces, gave five pickings, whereas another early variety, Thomas Laxton, gave only three pickings, but practically the same total yield, viz., 26 pounds 4 ounces. That is, Pioneer has a much more continuous bearing habit, and for a person wishing a continuous number of moderately sized pickings rather than a few large ones, it is an especially good variety.

Great variation will be noted in the percentage of crop picked at the first picking. For a really early crop the larger the yield at the first picking the better for the commercial grower, as at the beginning of the season the price is considerably higher. A big difference in this respect is noted between First of All and Childs Morning Star, the latter yielding nearly one-half its entire season's crop at the first picking.

PEAS, 1914.

	Record number. Record number. Number days from sowing to first picking. Number of per 100 ft. row.		Per cent crop picked first time.	Length of straw.	Length of pod.		
Early Varieties.				lb. oz.		inches.	inches.
Gregory Surprise Extra Early Pioneer Childs Morning Star First of All Thos. Laxton Nott Excelsior	3,316 3,320 3,319 3,317 3,223 3,328	51 51 51 51 54 54	4 5 4 3 3	29 0 25 12 25 4 24 8 26 4 21 0	26 72 32 67 48 51 16 32 45 71 38 09	20 20 26 20 24 12	2½ 2½ 2¼ 2¼ 2½ 3 2½
Medium.							
Sutton Early Giant. Excelsior (Gregory) American Wonder. Little Marvel Sutton Excelsior. Large Podded Alaska Premium Gem. Hundred Fold. Gradus Green Gem. Witham Wonder.	3,322 3,324 3,326 3,331 3,329 3,321 3,330 3,327 3,318 3,325 3,338	55 56 56 56 56 58 58 58 61 61 64	4 5 3 2 3 3 2 2 3 3 3 3 3	23 4 36 0 21 8 24 0 20 0 21 0 13 8 12 0 36 0 42 0	34:40 11:11 11:62 52:5 25:0 43:67 25:3 58:73 36:11 28:57 50:0	26 22 24 14 16 30 20 - 36 36 24	3554 22124 22354 2554 2554 2554 3554 3554
Late.]					
Burpee Quality. Dainty Duchess McLean Little Gem. Quite Content. McLean Advancer Burpee Quantity. Cracker Jack Lincoln Boston Wrinkled Juno Superlative Carter Danly Stratagem. Sutton Discovery Perfection Marrow Fat	3,333 3,340 3,341 3,334 3,335 3,339 A 3,345 5,339 B 8,336 3,342 3,342 3,343 3,337 3,344 3,332	66 68 69 69 70 70 72 74 77 77 77	2 2 4 2 3 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2	46 0 36 0 38 0 71 0 55 0 0 29 0 40 0 23 0 47 0 42 0 23 0	52·17 89·0 23·68 91·66 47·88 67·3 88·0 62·5 75·0 52·17 29·78 83·33 19·04 82·60	36 60 36 60 32 36 32 30 32 22 22 22	234 4 210 410 2410 234 234 32

EXPERIMENT IN THE USE OF FARMOGERM, A BACTERIAL CULTURE, ON GREEN PEAS.

Four varieties of pea seed were treated with Farmogerm and three rows 30 feet long of each of these varieties sown. Three rows of untreated seed were also sown at the same time, under the same conditions. Notes on the length of pod, yield and weight of straw were taken. Following is the result of these notes. The results varied considerably with the varieties, as will be seen by the table. The total yield of the four varieties in the treated plots was 25 pounds greater than the yield in the untreated plots. The length of pod seemed to vary as much one way as the other, as also did the weight of the straw. These results cannot be considered at all conclusive, but serve to show that there is a possibility of increasing the yield by the use of nitro cultures.

Variety.		Treated.		Untreated.			
	Length of Pod.	Weight of Straw.	Yield.	Length of Pod.	Weight of Straw.	Yield.	
Nott Excelsior	In. 21 22 22 24 21 22	Lb. 12 19 6	Lb. 16½ 34 43 39 132½	In. 21/3 23/4 3 21/2	Lb. 12 8½ 16 8½	Lb. 17½ 34 24 32 107½	

TOMATOES.

Variety tests in tomatoes were continued as well as experiments in training the vines to stakes, contrasted with allowing them to run on the ground.

With regard to the variety tests, the varieties are divided into three classes, early, medium early, and late. The early varieties are then classified according to the yield of marketable fruit for the first two weeks, commencing from the day that fruit is first picked from the earliest variety.

The medium early varieties are classified by total yield, and include those varieties which take not more than one week longer to ripen fruit than the earliest.

The late varieties include all those which take more than one week after the first variety has shown fruit to ripen. These are also classified according to total yield of marketable fruit. The column marked "number of days" gives the number of days from sowing until ripe fruit first appeared, following this is a column containing the yield for the first two weeks, and contains the total yield of marketable fruit for the whole season. The last column records the yield of green and bad fruit. The table gives the yield from five plants of each variety. All varieties were sown on the same date and handled in the same manner. In the field they were planted 4 by 4 feet apart.

Alacrity, which is the selected C.E.F. strain of Earliana, continues in the lead as

an early variety, other strains of Earliana coming close up to the top.

Those varieties under the heading "late varieties" are altogether too late for this district and are not to be recommended for planting. Only the best of the early and medium early varieties should be grown in sections as far north as Ottawa.

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Tomatoes, 1913-1914, Classified for Earliness, according to Yield for first two weeks.

Two year average from five plants.

Variety.	Number of days.	Fruit first two weeks.	Total yield Ripe Fruit.	Yield of bad and green Tomatoes.		
Alacrity. King Edward (Blue Stem Early) Extra Early Wealthy Earliana XXX Earliest Crimson Cushion Early June. Northern Adirondack No. 3. Earliest of All Carter Sunrise Dobbie Earliest Earlibell Bonny Bost Dominion Day Prosperity Chalk Early Jewel Industry Florida Special Dobbie Champion Ignotum Freedom	132 129 131 130 129	Lb. Oz. 18 9 16 12 16 10 16 6 15 6 13 13 13 10 12 9 11 3 10 14 8 10 8 3 7 13 7 9 7 6 6 5 5 8 4 13 2 11 2 0 1 8	Lb. Oz. 48 13 20 15 43 10 49 8 52 6 46 7 49 9 34 1 41 1 39 0 26 0 33 12 25 12 38 12 25 12 38 3 37 7 26 3 25 15 21 3 18 5 15 2	Lb. Oz. 38 6 40 13 39 10 30 8 38 8 38 5 94 1 32 4 34 6 48 7 44 11 37 0 35 3 41 2 34 2 34 2 34 6 36 3 36 13 43 10 42 14		

MEDIUM Early Tomatoes, classified according to total yield of ripe fruit.

. Variety.	Number of Days.	Yield First Two Weeks.	Total Yield.	Bad and Green.
I. X. L. Crimson Cushion Selected Earliana Prosperity First and Best. Jack Rose Sutton Satisfaction Watts Wonder Livingston Globe Comet Chalk Early Jewel Superb Salad Early Detroit Sutton Winter Beauty. Aome Sutton A 1 Great E. B Dwarf Champion Santa Rosa Late varieties classified according to total	134 128 132 132 134 136 130 131 134 134 136 136 136 134 135 134 133 138 138	Lb. Oz. 14 2 13 13 9 9 9 7 6 10 0 16 7 5 13 5 14 4 7 3 9 4 5 8 4 7 8 4 5 5 3 2 12 1 13	Lb. Oz. 46 15 46 17 45 0 38 3 33 9 32 4 27 5 24 9 22 10 22 3 21 9 20 12 16 3 14 10 14 8 13 4 9 4 7 18 7 0	Lb. Oz. 31 9 38 5 37 6 34 2 57 6 49 0 35 8 46 4 33 0 48 12 55 10 44 2 41 9 48 10 54 0 35 13 40 1 45 12 38 4
yield Livingston Beauty Great Baltimore Trucker Favorite Red Rock Selected Stone Ponderosa Magnificent Success Livingston Hummer New Magnificent Enormous Livingston Coreless Beefsteak	140 150 150 147 143 151 145 154 144 152 141 147 150	4 5 6 4 5 2 5 11 3 15 8 4 1 9 4 11 3 8 4 5 6 10 2 9 5 3	13 0 11 14 10 12 10 10 9 12 9 8 9 0 8 15 7 4 5 10 5 0	54 6 44 9 41 2 46 6 39 1 58 0 61 10 38 13 60 12 52 0 21 2 54 7 61 7

EXPERIMENT WITH STAKING AND PRUNING TOMATOES.

Three different plots of tomatoes each containing eleven varieties and five plants of each variety were used. One plot was pruned to a single stem and trained to an upright stake, the second plot was pruned to three stems and trained to a stake, while the third plot was pruned to three stems and allowed to run on the ground without any support.

The following table gives the list of those varieties, together with the total yields and dates of ripening. It will be noted that there was less unmarketable fruit from the vines grown on stakes than from those grown on the ground, although in a few instances the vines on the ground showed less unmarketable fruit than those on the stakes. In no case did the ground vines ripen any earlier than those on the stakes, while in nearly every instance the vines grown to stakes ripened from one to twenty-four days earlier than the ground vines. The vines pruned to a single stem were in most instances earlier than those pruned to three stems.

The fruits from the staked plants were much more handsome, and nicer in appearance. From these results it seems that pruning to a single stem and training to a stake is a letter method to obtain early fruit than pruning to three stems, and that either method has superior advantages over the ground method.

EXPERIMENT with Staking and Pruning, 1914.

		Date of	Total Yield.				
Variety.	Culture on One Stake.	Ripening.	Ripe fruit.	Bad fruit.	Green fruit.		
		,	lb. oz.	lb, oz.	lb. co		
Chalk Early Jewel	1 stake	Aug. 4	15 0 18 0	1 0	12 25		
Early Dawn	3 vines on ground 1 stake 3 "	Sept. 9	15 0 18 0 18 4	14 12 2 3 1 7	25 15 25		
Satisfaction	3 vines on ground 1 stake	Sept. 4	13 2 33 0 29 8	1 4 0 9	25 15 30		
Byron Pink	3 vines on ground 1 stake	Sept. 8 Aug. 15 Sept. 8	21 4 21 8 25 4	4 5 4 0 1 8	20 25 25		
Bonny Best	3 vines on ground	Sept. 8 Aug. 15 Aug. 31	16 12 27 0 22 12	2 14 0 4 1 2	25 20 30		
Livingston Beauty	3 vines on ground 1 stake	Sept. 8	23 8 19 9 20 4	2 0 0 10 0 14	30 15 40		
Chalk Early Jewel	3 vines on ground	Sept. 14 Aug. 4 Sept. 4 Sept. 8	5 5 26 0 21 8 22 8	2 10 ' 1 13 1 7 7 3	30 15 30 30		
Holyrood,,	3 vines on ground 1 stake 3 "	Aug. 17 Sept. 19.	25 0 13 0	0 11 0 4	20 40		
Earliest of all	3 vines on ground	Sept. 8 Aug. 15 Aug. 31	13 0 33 4 38 4	0 2 1 14 3 9	25 15 15		
Red Rock	3 vines on ground	Aug. 17 Sept. 19	19 3 8 4 48 0	7 2 0 2 0 4	15 20 30		
Livingston Glole	3 vin-s on ground	Sept. 4	15 2 8 4 8 0	1 4 2 4 1 0 0 4	30 20 25 45		

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EXPERIMENT IN PRUNING CUCUMBERS.

One hill of each of the nine varieties included in the test was pruned in the following manner:—

The vines were pinched back when they had about four leaves on them. The tips of the leader were simply pinched off, and the operation was repeated in about two weeks' time. This had the tendency to induce much lateral growth.

The pruned vines in every case except one showed a larger number of marketable fruits than the unpruned, and the total yield of marketable fruits from all the pruned vines was thirty-two fruits more than from the unpruned, or 19 per cent greater. The total yield of all kinds of fruit was 286 fruits from the pruned and 234 from the unpruned. Of these the pruned vines gave 52 per cent of marketable fruits and 48 per cent unmarketable, while the unpruned gave 49 per cent marketable and 51 per cent unmarketable fruits.

The difference in percentage of marketable and unmarketable fruits from the two methods does not seem very great, but the difference in total yield is considerable, and in favour of the pruned vines.

Variety.		Pruned.	Unpruned.		
	Date of pruning.	No. of fruits marketable.	No. of fruits un- marketable.	No. of ruits marketable.	No. of fruits un- marketable
Davis Perfect. Early Fortune White Spine Fordhook Famous Jiant Pera. Prosperity New Century Klondyke. The Mimms.	\ugust 20 1	22 22 21 20 12 18 6 19	17 15 18 10 17 21 13 16 12	17 11 15 19 10 13 8 16 6	15 13 12 11 12 15 12 18 11

MUSKMELONS.

Twenty-four varieties of muskmelon in all were tested this past season. All melons were started in the greenhouse in strawberry boxes, five plants being grown to a box. At the time of removing to the hotbeds, the three best plants were selected and allowed to remain in the box, while the other two were removed. This gave three plants to a hill, and each hill occupied one light of the hotbed. A trench about two feet deep and two feet wide was dug through the centre of the hotbed and filled with manure. This gave bottom heat to the hills and at the same time was much less expensive than filling the whole area of the bed with manure.

The yields recorded were for one month only, beginning at the first picking. Following is a list of the best ten varieties, classified according to earliness and yield,

and also according to total yield only.

Muskmelons, 1914.—List of best ten early melons, classified according to date of ripening and yield. Yield taken for one month only in every case.

Variety.	Date of ripening.	Number of fruits.	Total weight of fruits.	Yield from		
Earliest Ripe Improved Watters Solid. Paul Rose. Rocky Ford Flat Jenny Lind. Long Island Beauty. Irondequoit. Daisy Isbell Grand. Emerald Gem.	July 12	39 43 40 39 34 24 21 43 36 33	Lb. 35 86 33 30 28 58 46 45 39 27	July 12 to Aug, 12 1 14		

The best ten melons classified according to total yield only:-

Variety.		Date of pening.	Total weight of fruits.	Yield from			
Montreal Market Supprise. Long Island Beauty Montreal Nutmeg. Cox Strain. Hackensack Irondequoit. Daisy Sweet Sugar. Lshell Grand	July	22 23 16 29 31 18 16 16 16	Lb. 78 63 58 52 50 47 45 45 42 39		7 22 to 23 16 29 31 18 16 16 16	11 11 11 11 11	23 16 29 31 18

EXPERIMENT IN GROWING MELONS IN POTS VERSUS GROWING IN STRAWBERRY BOXES.

The method of growing melon plants in the greenhouse ready for outdoor work has in the past always been in strawberry boxes, growing three plants to a box. Thus each box constituted a hill. An experiment in which this method was contrasted with that of growing each plant in a separate pot was conducted. When the plants were set out in the frames, the plants from the pots were placed three in a hill, the same as those in the strawberry boxes. The size of pot used was 3 inches. There appeared to be no advantage gained by using the pots, in fact the total yield from the vines sown in pots was nearly seventeen pounds less than from the same number of vines sown in strawberry boxes.

The strawberry boxes also have the advantage of being able to be packed closer, and thus take up less room in the greenhouse.

Variety.	Grown in Baskets.		Grown in Pots.		
	Ready for use.	Total yield.	Ready for use.	Total yield.	
Irondequoit Earliest Ripe Hackensack Hoodoo. Cox Strain Montreal Market Burrell Gem Rocky Ford Improved Watters Solid Isbell Grand Spiey Cantaloupe Melting Sugar. Henderson Bush* Flat Jenny Lind Surprise Fordhook Joinson Dreamwold Field Daisy Improved Montreal Nutmeg Jenny Lind Sugar Sugar Sugar Sugar Henderson Bush* Flat Jenny Lind Surprise Fordhook Joinson Dreamwold Field Daisy Improved Montreal Nutmeg Jenny Lind Sugar Sweet Long Island Beauty Emerald Gem Paul Rose	14	Lb. Oz, 19 2 9 10 14 14 18 0 18 8 13 14 7 8 6 0 6 14 8 6 12 0 5 4 9 9 9 12 11 12 3 12 3 12 8 0 12 12 10 4 16 2 17 2 9 2 5 0	July 20 12 18 18 18 18 18 18 18 15 18 17 17 16 17 18 18 17 16 19 18 .	Lb. Oz. 6 11 8 8 8 9 12 3 10 26 4 6 2 8 .1 8 3 11 0 12 8 13 12 8 13 12 9 15 6 4 14 6 10 12 9 8 10 6 10 6 10 6 9 8 9 9	
Total Yield		260 15		233 9	

EXPERIMENT IN PRUNING AND PINCHING BACK MELON VINES.

The pinching was done when the melons were transplanted from the boxes to the frames, or very shortly after, the tips of the central shoot being removed. After the vines had made about one and a half or two feet of growth the shoots were again pinched off. This causes the production of laterals, and enables the vines to be more casily distributed in the frames, and as the laterals bear melons the largest crop of melons possible is obtained from a small space. As soon as the melons were fit the shoots were pinched off at about two nodes beyond the fruit. This is also done to economise space.

The results from this year's pruning test are given in the following table:

RESULTS of Pruning versus not Pruning in Melons.

Name.	Pruned .		Unpruned.		
	Read for use.	Total yield.	Ready for use.		eld.
Irondequoit Earliest Ripe Hackensack Hoodoo Cox Straim Montreal Market Burrell Gem Rocky Ford Improved Watters Solid Isbell Grand Spicy Cantaloupe Melring Sugar Henderson Bush Flat Jenny Lind Surprise Fordhook Johnson Dreamwold Field Daisy Improved Montreal Natmeg Jenny Lind Sugar Sweet Long Island Beauty Emerald Gem Paul Rose	July 16 12 18 28 31 28 31 20 14 16 22 25 18 15 24 17 18 17 18 16 29 18 16 29 18 16 29 18 16 29 18 16 29 16 14	Lb. Oz. 15 2 11 11 14 0 11 4 23 10 26 2 11 14 8 6 10 2 9 4 9 10 2 12 6 9 6 0 26 10 6 8 7 12 13 6 26 2 8 12 7 0 8 10 13 14 9 5	July 18 14 18 18 19 18 17 18 17 18 17 14 16 25 28 17 120 28 17 19 20 21 20 21 20 19 21 20 19 21 20 19 21 20 19 21 20 19 21 20 19 21 20 19 21 20 19 21 20 19 21 20 19 20 19 21 20 19 21	Lb. 19 9 14 18 13 7 6 6 8 8 12 5 9 11 3 8 12 10 16 17 9 5	Oz. 2 10 14 8 0 4 18 0 14 6 6 0 12 2 12 12 0 12 2 0
Total yield,		284 5	1	261	15

From the foregoing list it will be seen that pinching back gave earlier fruit in nearly every case, the difference in favour of pinching being as high as six days in some cases. In fact in four cases only did the unpruned vines set fruit earlier, and in these cases were only one and two days earlier. In three cases there was no difference. In the others the average gain due to pinching amounted to three and a quarter days, ranging from a gain of two days to six days.

The total yield from the pruned vines was 22 pounds and 10 ounces greater than that from the unpruned.

DESCRIPTION OF A FEW OF THE BEST VARIETIES OF MELONS GROWN AT THE CENTRAL EXPERIMENTAL FARM IN 1914.

Melons may be divided into two distinct classes according to size, one in which the melons are of small size, averaging from less than a pound to a pound and a half, and another in which they are of distinctly larger size, ranging from two to even as high as five pounds and sometimes over.

In the first class are such melons as Rocky Ford, Paul Rose, Jenny Lind, Earliest Ripe, and Emerald Gem. These small melons are considerably earlier than the larger sizes and are of excellent quality. The larger class of melons includes such varieties as Montreal Market, Long Island Beauty, Hackensack, and Surprise.

Although all melons were grown in the hot frames last year, it is intended in future to grow only those of the larger class in the hot frames, growing the smaller ones in the open covered with small forcing frames to start them off in the spring.

The total yield received from the smaller melons hardly warrants the expenditure of as much time and labour as is entailed in frame culture.

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Larger Class of Melons.

Muskmelon—Montreal Market.—Size 6 inches by 6 inches; form, roundish oblate; sections—distinct, deep; colour—light green, turning yellow; flesh—green, firm, juicy; flavour, very sweet and fine; quality—very good; season, July 22 to August 22. Strong plant and vigorous.

Muskmelon—Long Island Beauty.—Size 5½ inches by 6 inches; Form, roundish oblate; sections—distinct, deep; colour—light green, turning yellow; flesh—green, firm, juicy; flavour, very sweet and fine; quality—very good; season, July 16 to August 16. Good plant.

Muskmelon—Hackensack.—Size 43 inches by 63 inches; form, oblate; section—deep; colour—turning golden yellow; netting—strong and close; flesh—13-inch, green, soft, juicy; flavour—sweet, somewhat coarse; quality—medium to good; season, July 18 to August 18; weight—4 pounds; plant very good and vigorous.

Smaller Sized Melons.

Muskmelon—Flat Jenny Lind.—Size, 3½ inches by 4 inches; shape, oblate, smooth; sections—distinct, medium, deep; colour—dark green turning yellow; netting—strong, close, uniform; flesh—green, juicy, sweet, ¾ inch; flavour—good; quality—very good; season—July 15 to August 15; fair plant.

Muskmelon—Rocky Ford.—Size, 4\(\) inches by 3\(\) inches; form—oval, attractive; sections—indistinct, shallow: colour—dark green; netting—strong, close; skin—thick; flesh—green, juicy; fiavour—sweet; quality—medium to good; season—July 14 to August 14; fair plant.

Muskmelon—Paul Rose.—Size 5 inches by 4\(\frac{2}{3}\) inches; form—oval; sections—distinct, shallow; colour—dark green; netting—strong, fairly close; flesh—salmon pink, 1\(\frac{1}{3}\)-inch; flavour—good, strong; quality—good; season—July 14 to August 14; weight—1 pound; fair plant.

Mushmelon—Jenny Lind.—Size, 3½ by 4½ inches; form—oblate, knobbed at apex; sections—distinct, fairly deep; colour—light green; netting—strong and close; flesh—green; flavour—fair; quality—medium; season—July 17 to August 17; weight, 1 pound; fair plant.

BEANS.

The following varieties were sown for green picking in 100-foot rows and gave the following yields in green or string beans. The column marked "number of days" refers to the number of days from time of sowing until the beans were ready for use.

Varieties.	Record No.	Yield.	No. of days till ready for use.
Lazy Wife Pole Bean Extra Early Refugee Extra Early Valentine Scarlet Runner Pole Bean New Hodson Wax. French Stringless Runner Pole Bean Horticultural D.P.B Fordhook Favorite. Improved Black Wax. Grennell Pencil Pod Keeney Rustless Wax Red Valentine Sutton Plentiful. Dwarf Ohocolate. Tender and True. New Kidney Wax. Horticultural Pole Bean Full Measure Bushel Superlative. Davis Wax. French Stringless Runner Pole Bean Extra Early Kefugee. New Gloson Wax. Grennell Pencil Pod Keeney Rustless Runner Pole Bean Furture Davis Wax. French Stringless Runner Pole Bean Extra Early Kefugee. New Hodson Wax. Grennell Pencil Pod Keeney Rustless Golden Wax Extra Early Valentine	0 · 3689 0 · 3669 0 · 3669 0 · 3671 0 · 3672 0 · 3675 0 · 3675 0 · 3676 0 · 3676 0 · 3677 0 · 3685 0 · 3674 0 · 3685 0 · 3677 0 · 3685 0 · 3674 0 · 3685 0 · 3675 0 · 3685 0 · 3674 0 · 3685 0 · 3685 0 · 3685 0 · 3685 0 · 3685	Lb. Oz. 132 0 125 8 119 8 88 0 80 0 77 0 76 0 69 0 64 8 64 0 63 0 59 0 57 0 56 0 52 0 52 0 51 0 51 0 48 0 40 0 40 0 37 8 32 0 31 0 28 0 26 0 24 0	50 61 63 73 74 91 74 85 60 62 57 74 61 61 60 78 88 69 74 71 71 74 60 97 49 71 90 81 73 84 85

TOMATO EXPERIMENTS IN THE GREENHOUSE.

Experiments in different methods of training tomatoes in the greenhouse were conducted, also a test of some of the best varieties for greenhouse work.

The training or pruning experiments consisted of growing the vines to a single stem as compared with growing to two and three stems. In the two and three-stem plots, the effect of pinching at different dates was also tried out.

The one-stem plants were set 18 inches apart each way, and the two-stem plants 2 feet apart each way, while the three-stem plants were put 3 feet by 2½ feet.

The accompanying table gives the results of these experiments. The yields are all worked out per square foot, as the object of the experiment was to determine which method of training would give the highest yield per square foot.

Yields of marketable fruit per square foot from different methods of training and pinching:—

1	stem		 	 	2.77	pounds	per square fo	ot.
		August 6					44	
2	66 .	one week later	 	 	1.32	14	- 11	
3	66	August 6	 	 	*78	44	61	
3	44	one week later						

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The one-stem plants gave by far the largest yield per square foot and in addition to this they ripened their fruit much earlier giving their first picking sixteen days curier than any of the other methods. For Bonny Best the dates of ripening for the different methods were:—

	Stem	November	3.
2	stem, pinched August 6	44	9.
2	" one week later	6.6	21.
3	" August 6	. 44	12.
3	" one week later	66	21

It will be seen from the above that the three-stem plants were the latest, and also that the second pinching in both cases gave later ripening plants. Part of the lateness of the first pinching in both the two- and three-stem plots may be due to this practice as the one-stem plants were not pinched at all.

For both this and the following experiment, the seed was sown on July 11, 1914. Seeds germinated July 14. Plants pricked into three inch pots July 23 and into four inch pots August 11; and planted into the bed on September 5.

VARIETY TEST OF TOMATOES IN THE GREENHOUSE.

Twelve varieties were tested, all being planted 18 inches apart and trained to a single stem. The dates of ripening and total yields are recorded below on a comparative basis of thirty-six plants of each variety.

Variety.	1st Picking, 1914.	Total yield of marketable fruit.
1 Hipper No. 2. 2 Frogmore. 3 Livingston Globe. 4 Bonny Best. 5 Dobbie Champion 6 Sutton Winter Beauty. 7 Comet. 8 Sutton A 1 9 Dobbie Earliest. 10 Industry. 11 Sutton Satisfaccion. 12 Early Dawn	October 31	1b. oz. 131 6 105 9 103 10 105 0 101 13 101 1 98 1 87 9 80 2 74 4 67 1

A NEW METHOD OF BLANCHING CELERY.

This past season a new method of blanching celery was tried and found very satisfactory. This method was the use of a commercial product called "Celery Bleacher," which resembles very much many of the roofing papers on the market. It is made in two widths, 12 inches and 15 inches, and comes in large rolls. The material is simply placed around the row of celery and kept in place by wires which are bent in the form of a staple and inserted in the ground, the bleacher passing between the two sides and thus being prevented from spreading or rising.

The practical benefit to be derived from this method is that of economy of land, for by using this bleacher, colory may be grown in rows three feet apart instead of four feet apart as was the case in the old method of dirt blanching. The material will last for years with care and should not in the long run be an expensive proposition. Any composition roofing paper of the right height will serve the purpose, the only thing to bear in mind being to obtain a product that does not give off any odour of tar, as this might be absorbed by the plants during blanching.

LIST OF BEST VEGETABLES.

Asparagus.—Palmetto is proving a better variety than Conover Colossal for general planting, as it is not so subject to the disease known as Asparagus Rust. Argenteuil is also a good variety.

Beans.—Round Pod Kidney Wax and Wardwell Kidney Wax are two of the best yellow podded or wax bush beans, and are both early. The Hodson Wax is a large podded variety which has proved productive. Stringless Green Pod, Early Red Valentine and Early Refugee are three good, green-podded varieties. Refugee or Thousand to One is one of the best later sorts. Among Lima beans, the dwarf or bush forms are the most satisfactory.

Beets.—Meteor, Detroit Red, Crosby Egyptian and Eclipse are some of the besi-

Borecole or Kale.—Dwarf Green Curled Scotch.

Brocoli.-White Cape.

Brussels Sprouts.—Improved Dwarf. The Dwarf varieties have been found more satisfactory than the tall-growing ones.

Cabbage.—Early Jersey Wakefield, Copenhagen Market (carly), Succession (medium), Danish Ballhead (late), and Drumhead (a Savoy variety. Red Dutch is a good red. Houser has been found freer from disease than most. For extra early use, Paris Market is desirable, being nearly a week earlier than Early Jersey Wakefield.

Cauliflower.—Early Dwarf Erfurt and Early Snowball.

Carrots.—Chantenay is one of the best, but if a good extra early sort is required, the Early Searlet Horn can be planted with advantage. It is a small variety.

Celery.—Golden Self-Blanching (Paris Golden Yellow) (early), French Success, Noli Magnificent, Perfection Heartwell, Evans Triumph, Winter Queen are all good late varieties. London Red is a good red one. White Plume is desirable for the prairies.

Corn.—Malakoff, Early Malcolm, Peep o' Day (extra early), Early Fordhook, Early Cory (early), Crosby Early, Golden Bantam, Metropolitan (second early), Perry Hybrid, Early Evergreen and Black Mexican (medium), Stowell Evergreen, Country Gentlemen (late). In planting, the Country Gentlemen should not be omitted, as it lengthens the season very considerably and is of fine quality. Golden Bantam is the best second early for home use. It is of excellent quality.

For the prairie provinces and other parts of Canada where the nights are cool, Squaw and Extra Early Adams, though not sweet varieties, develop better than others.

Cucumbers.—Peerless White Spine or White Spine, Davis Perfect, Cool and Crisp, and Giant Pera are some of the most satisfactory. Boston Pickling and Chicago Pickling are good pickling sorts.

Egg Plant .- New York Improved and Long Double Purple succeed best.

Lettuce.—Grand Rapids, Black-seeded Simpson (early curled), Iceberg, New York, Giant Crystal Head, Crisp as Ice, and Improved Hanson (curled cabbage), Improved Salamander (uncurled cabbage). Grand Rapids is the best variety for forcing. Iceberg remains headed longest in summer, and should always be planted. Trianon and Paris are two of the best Cos varieties.

Melons.—Musk: Long Island Beauty and Hackensack are two of the earliest and best of the nutmeg type. Montreal is later, but of larger size and finer flavour. Emerald Gem and Paul Rose are two of the best yellow-fleshed melons.

Melons.—Water: Cole Early, Salzer Earliest, Ice Cream, Phinney Early are some of the most reliable.

Onions.—Yellow Globe Danvers and Large Red Wethersfield are two of the best and most reliable. Australian Brown is also good. For the prairies, the Early Flat Red is one of the most reliable. Prize Taker is a good variety for transplanting.

Parsley.—Double Curled is as good as any.

Peppers.—Cayenne, Chili, Cardinal. The Early Neapolitan is one of the earliest of the large peppers.

Peas.—Gregory Surprise (extra carly), Thos. Laxton, Gradus, American Wonder, Nott Excelsior, Premium Gem (second early), McLean Advancer, Heroine and Stratagem. (medium to late). The foregoing varieties, not being tall growers may be grown without supports. Quite Content, Telephone and Champion of England are three of the best tall-growing sorts.

Potatoes.—Early: Rochester Rose, Early Ohio (pink), Irish Cobbler, Eureka Extra Early, Early Petosky, New Early Standard (white), Bovee (pink and white), Main Crop: Carman No. 1, Gold Coin and Green Mountain (white). Table Talk and Davies Warrior are very promising.

Radishes.—Early: Scarlet White Tipped Turnip, Rosy Gem, French Breakfast, Red Rocket (red), Icicle (white). Late: White Strasburg, Long White Vienna. Winter: Long Black Spanish, Chinese Rose-coloured, New White Chinese or Celestial.

Rhubarb.—Linnaeus, Victoria.

Salsify .- Long White, Sandwich Islands.

Spinach.-Victoria, Thickleaved.

Squash.—White Bush Scalloped, Long White Bush, Long Vegetable Marrow, Summer Crook Neck. Late: Delicious, Hubbard.

Tomatoes.—Early: Sparks Earliana, Alacrity, Chalk Early Jewel, Bonny Best, Dominion Day (scarlet). Medium: Matchless, Trophy (scarlet), Livingston Globe, Plentiful (purplish pink).

Turnips.—Early: Extra Early Milan, Red Top Strap Leaf. Early Turnips are vsually bitter to the taste and not desirable.

Swedes.—Champion Purple Top, Skirving Improved.

ORNAMENTAL GARDENING.

(F. E. Buck, B.S.A., Assistant in Charge.)

The purpose of the work of the Experimental Farms being manifold it is but natural that that purpose should include the improvement of the surroundings of the home.

At first thought it might be considered that those activities, which are carried on at the Experimental Farms, in connection with such a purpose, would be more in keeping with the other phases of Experimental work, were they concentrated on the improvement of rural and farm homes. However, if due consideration be given to the question, it soon becomes apparent how intricately woven together are all types of homes, whether farm, rural, suburban or city, and this question of home improvement is then seen to have a wider significance. The real aim of these activities in ornamental gardening is then the production of a finer type of Canadian home, irrespective of whether it happens to be the abiding place of labourer, farmer or merchant.

The policy therefore directing such activities, is one based on a full appreciation of the demands of a developing home-making spirit seeking national expression. A policy which seeks to encourage, as far as possible, the improvement of home surroundings whether such be limited to a 25-foot city lot or extend to several acres around the farmhouse.

Inasmuch as all surroundings of the home depend, in the first place, upon a suitable assortment of hardy plants arranged in tasteful ways, in order to make such surroundings attractive and pleasing, it becomes necessary for the Horticultural Division of the Farms to experiment with a large number of such plants. These plants are put under test for the purpose of finding out which of them are best suited to meet the varying conditions of climate and soil found in Canada. Such plants then, or in other words, the material which is used for beautifying the external parts of the home may be classified, for convenience, as follows:—

First.—Ornamental and flowering trees and shrubs in several thousand species and varieties.

Second.—Ornamental and flowering herbaceous perennial plants also in several thousand species and varieties.

Third.—Ornamental and flowering annual plants in many hundred species and varieties.

There are also to be included with these plants, lawn grasses, certain forest trees and other forms of plant life which are frequently used in the work of ornamental gardening.

The work which is involved in dealing with these plants, when briefly outlined, falls under four or five headings. There are:—

1. The work of introducing and testing New Plants and Novelties.—In connection with this phase of the work, it may be stated that frequently novelties and plants new to Canadian conditions, make their first appearance at the Central Farm, Ottawa. Novelties listed each year by various seedsmen are grown and reported on as soon as they are offered to the public. In addition, large numbers of plants, valuable in other

countries, are introduced into Canada by the Farms System. In the allied line of work, namely, that of testing out well-known plants, the aim is to find out the best strains and varieties from the many offered to the public, and to advise, through the media of the Report and Bulletin, which are most suitable for Canadian conditions. The test work deals with all of the groups of plants mentioned above.

- 2. The work of Demonstrating How, Where and When to grow the best plants for all conditions is the second phase of the work.—It involves the actual growing of the plants in beds and borders and the grouping of shrubs and trees on lawn and road-side, etc., to demonstrate the uses of various ornamental plants. In other words, it is the landscape phase of the work and includes the laying-out of the home lot and certain types of ornamental grounds.
- 3. Best Cultural Methods.—Next in importance to the work of finding out the relative hardiness and use of plants comes the matter of the best cultural methods. Within a single group of plants, the rose for example, several methods of culture must be followed, to suit the different needs of the different varieties. Much information has been gathered during recent years with regard to cultural requirements of popular flowers like the sweet pea, China aster, etc.; but in this same connection much work remains on the programme of the future. The number of quotations reaching the Farm in this connection is very steady and continuous.
- 4. Combating Insect Pests and Plant Diseases.—And last but by no means least in importance, is a phase of work which is still in its beginning stages, and that in spite of the fact that a very great deal has been done already, here and elsewhere, to solve some of its difficulties. Such work has to do with spraying, and other methods adopted to prevent the ravages of insect pests and fungous diseases. The practical problems as far as ornamental plants are concerned, are, however, very numerous and involve much labour and careful attention.

It should be pointed out, that the last three phases in particular, of the activities in ornamental gardening, bring the work of the Experimental Farms into touch with city more than country people. While the many local horticultural societies have done such splendid work during the past few years and have wrought an invaluable service in creating an interest in beautiful homes and gardens, it should be pointed out that their activities do not lessen but rather make more vital and fundamental similar national work at the Experimental Farms.

In the following pages, this report deals this year with a limited section only of the work carried on at Ottawa. Much of the work can be reported on, in an interesting and useful way, only when such work is dealt with as it matures.

The report on the sweet pea this year is not final. It does, however, sum up a large number of interesting facts which have been recorded to date.

The report on the annual flowers is of such a character that it has to be recorded each year in this way in order to be of the greatest use.

Other work besides that reported on at greater length in the following pages, which should be mentioned briefly, is as follows:—

NEW GREENHOUSES.

One of the new greenhouses, which were built at the Farm during the past year for the use of the Horticultural Division has been set aside for the work connected with ornamental gardening. In this house experimental work is now started which aims to solve simple problems, etc., in connection with the care and culture of plants in the house, and the best plants for home use. In this house are also grown the bedding plants used on the Ornamental Grounds of the Central Farm, and many of the annuals tested each year will be started in this house from now on.

NEW BULBS.

Some new varieties of Darwin tulips, narcissi, iris germanica, paeonies and roses made useful and interesting additions to the collections of these plants which are tested each year at the Central Farm.

Amongst the tulips the new Darwins proved the attraction of the season. The variety Baronne de la Tonnaye proved its merit as a bedding variety. It came splendidly even, finely tall and beautifully symmetrical. It remained in flower from May 22 till June 9, a period of eighteen days. This is a record number of days for a bedding tulip to remain in bloom. It should prove a popular bedding variety as it is not expensive. Other beautiful and promising varieties of the Darwins are:—Bartigou, Clura Butt, Edmee, Europe, Galathea, Isis, King Harold, Madame Krelage, Yellow Perfection, Cupido, Ouida, Professor Rawenhof, Whistler and Dream.

Amongst new narcissi which gave a good account of themselves are Albatross,

Eyebright, Laureate, Cornelia, Lucifer, Spinnaker, Torch and Seagull.

NEW IRIS AND PAEONIES.

A collection of new varieties of *Iris germanica* and a few *Iris Kaempferi* were obtained in 1012. During the past spring and summer many of them flowered for the first time. Many of them are not, as far as they indicate at present, improvements on the older varieties already grown at the Farm. Others, however, are of promise and will prove valuable additions to this group of flowers. *Iris Kaempferi* or the Japanese iris, blooms much later and is a most striking and useful flower when it succeeds well. It needs much more moisture than the German Iris. The latter is perhaps one of the hardiest and most useful of those plants which will stand adverse city conditions.

Many of the new paconies imported in 1912 flowered for the first time this past spring. The pacony does well at Ottawa and is one of the flowers which, during its season, is a rival of the rose. Its popularity is merited because it will succeed where the rose is often too tender.

ROSES.

Lists giving the merits, colours, etc., of the newer roses imported since 1911 will be found in the New Edition of the Rose Bulletin. The very severe winter of 1913-14 did not injure the bushes to any extent, and the method of protecting them has been followed again this winter. The crop of flowers during the summer of 1914 was very luxuriant, and many very beautiful new varieties were seen at their best. The new race of Austrian Hybrids or Pernetiana roses promises to become a charming addition to bedding varieties for the rose garden. These roses appear to be about as hardy as the Hybrid Tea roses.

MODERN SWEET PEAS.

"Here are sweet peas on tip-toe for a flight, With wings of gentle flush, o'er delicate white, And taper fingers catching at all things To bind them all about with tiny rings."

Keats, many years ago, wrote thus of the sweet peas. The modern sweet pea is as superior, however, to the flower of the same name which he so charmingly immortalized in verse, as is the modern garden rose to the wild rose of the wayside.

Up till about the middle of the last century the sweet pea was of one type only and the colours were few, not more than half a dozen. The modern sweet pea, however, which is solely the product of plant hybridists from about the year 1870, is of several types and its range of colour is almost unlimited. The fact that there are now so many varieties of this popular flower is one reason why a rather comprehensive test has been carried on in connection with it, at both the Central Experimental Farm at Ottawa and at many of the Branch Farms in various parts of the Dominion.

MAIN OBJECT OF SWEET PEA TRIALS.

As suggested, there are many colours, shades and tints of the modern sweet nea. at least forty or fifty. This, of course, may not be a source of confusion to the amateur grower of this beautiful flower, but what, however, is undesirable in this connection is the fact that any one particular shade or tint of sweet peas may be sold and described by twenty different firms as twenty different varieties. This does cause confusion in the minds of all who grow this flower. The first main object of the comparative trials at the Central Farm, therefore, has been to find out which, two or three out of a dozen or twenty exactly similar differently named varieties, are the best in any particular shade, tint or colour. In many cases it is impossible to pick out just one and say, "that is the best." It is, however, generally more simple to pick out several, or even half a dozen, from a much larger number and give them premier places. This is particularly true of pink sweet peas, as there is a very large number or differently named but similar peas in this colour or its tints. The first choices in connection with peas of more pronounced colours like blue or chocolate-maroon are More easily made, as named varieties are not as plentiful.

Each year a large number of new sweet peas known as the "novelties of the year" are offered by the raisers to the public. The Central Farm has for several years past carefully tested such novelties. In some cases they prove to be superior to the older varieties, in others inferior. This year the new white sweet pea introduced by one of the largest growers, named "King White," proved itself to be the best white at the Central Farm and it is so recorded in the list which follows. Several of the older sweet peas in other colours did not have to give place, however, as far as the Ottawa

trials indicated, to newer introductions of supposedly superior merits.

The second main object in connection with the trials is that of acquiring fuller and reliable information in regards to the best methods of culture for the sweet pea. What have been found, so far, to be the best methods are dealt with under a subse-

quent paragraph.

And the third main object in the same connection, is that of testing out methods which are best suited for the control of the insect troubles and diseases of the sweet pea vine. What has been found effective in such connections is also recorded in subsequent paragraphs.

SWEET PEAS AT OTTAWA.

For some years past sweet peas have been grown under trial conditions at the Central Farm at Ottawa. Many interesting points with regard to cultural methods and the effects of season have been recorded. Each year for the past three years one

hundred and fifty or more of the best varieties have been selected from the principal growers of this continent and Great Britain. To each of about fifteen of the Branch Farms duplicate but smaller collections have also been sent, for the purpose of making as complete observations, as possible, of the effect of climatic conditions on the productiveness and success of this flower.

The Spencer type of sweet pea has been used more than any other for these trials. A few of the best and better known varieties of the grandiflora type have been included. In this connection it may be well to add a few more historical notes on the origin of the modern sweet pea, especially those known as Spencer types.

HISTORICAL NOTES.

A hundred years ago few people thought anything of the sweet pea. To-day it is known and highly esteemed by at least fifty per cent of the population of modern countries where it will grow successfully. About twenty years ago real enthusiasm for the fragrant flower began to develop, and now during the months of May, June and July, countless millions of these fairy-like flowers are picked by delighted enthusiasts for the sake of their fragrance and charm as decorative flowers. For decorative uses the type known as the Spencer, or waved, is the best.

The origin of the Spencer type of sweet pea, with its waved and fringed segments, dates back to July, 1901, when the variety known as Countess Spencer, a beautiful pink, was first shown at the National Sweet Pea Society of England at the date of its annual exhibition in London. It was originated by Mr. Cole, then gardener to Earl Spencer. From 1870 up till that date many fine varieties of sweet peas had been produced, chiefly by such experts as Mr. Henry Eckford, but they were of the grandiflora type, the segments of which are not waved as they are in the beautiful Spencer types.

While waviness or frilling adds, a new beauty to the sweet pea, it must not be concluded that all other types are discounted by not having such waviness. Many of the old smooth, or grandiflora, types are still very popular and will always remain so. There is now an immense demand for sweet peas. The present popularity of this flower is no doubt, however, due to the introduction of the Spencer type.

In the matter of type or form, the modern sweet pea may be grouped into three divisions, that is, those with smooth standards, like Dorothy Eckford; those with hooded standards, like Lady Grizel Hamilton; and those with waved standards, like Countess Spencer. But these divisions should not be bothered with except by those who are interested in raising new varieties. Probably the public will never be sufficiently enthusiastic over one form to discriminate in its favour against all others, especially as all forms of the sweet pea are beautiful. It is to be expected, therefore, that for many more years there will be popular varieties amongst all types of the sweet pea.

COLOUR OF SWEET PEAS.

Colour in sweet peas is a modern development. Seedlings of the Spencer types have added to the already considerable number of colours which hybridists produced in the older types prior to the introduction of the Spencers in 1901-1903. But the sporting or variable habit of the Spencer peas has given a number of additional shades and tints. It may be of profit to note here that the word "shade" should be used to signify a colour which has been deepened or strengthened by the addition of a black pigment, and a tint is a colour which has been reduced or lightened by the addition of a white pigment, that is, in mechanical manufacture this is the method of producing shades and tints. In the matter of colours, in flowers, nature has several methods of creating new tints and shades, and of course, colours. It is too technical a question to deal with here. It is mentioned, however, to explain the following system of classification.

The sweet peas in the following list are grouped first of all into one large group indicated by a colour. Such group is then further divided into its tints and shades and possibly hues (a hue generally signifying a colour produced by a mixture of two or more colours). With regard to this grouping, it must be pointed out that it is a tentative plan used in the test plots in order to facilitate more expeditious note-taking on the merits of the varieties. While it is a plan of colour classification, which differs from the more usual plans, it has its merits, it is believed, as it enables one to see at a glance certain interesting facts relating to colour in sweet peas, and its practicability in the work of classification in the test plots is another recommendation.

It has been thought wise to add to this list a second one which follows an alphabetical plan of colour classification. In many cases the ranking of the peas is different. As, however, no two lists of the best sweet peas is alike, this is of secondary importance. The list is a valuable one although several years old.

Best Sweet Peas, from notes revised to 1914.

Colour.	One of the Best of the Colour.	Other Choices of Same Colour.
White		Etta Dyke, Dorothy Eckford, Nora Unwin, Burpee White.
Cream	Primrose Paradise Nubian	Mrs. Collier, Clara Cartis. Othello Spencer, Paradise Colossus, Black Knight.
Blue, and shades and tints of blue—Light Blues	Princess Mary	Helen Pierce, Flora Norton Spencer, Paradise Celestial, Wedgewood, Zephyr, Empress Eugenie.
Dark Blue	Lord Nelson Tennant Spencer	Orchid, Asta Ohn, Irish Belle, Mrs. Walter Wright.
Red, and shades and tints of red-	Florence Nightingale King Edward Spencer	Paradise Peacock, Moonstone. Mand Holmes, Dubbie Sunproof
Scarlet Crimson	Scarlet Emperor	Crimson, Crimson Paradise. Queen Alexandra, Vermillion Brilliant.
Ruby Red	- 1 7 1 7	Martha Washington, Elsie Herbert,
Light Pinks		Mrs. Hardcastle Sykes, Prima Donna, Zarina, Duplex Spencer, Paradise Cherry Ripe. Ethel. Roosevelt, Mrs. Routzan, Lilian, Paradise Ivory, Mrs. C. W. Breadmore, Mrs. Hugh Dickson, Helen Chetwynd Stapylton.
Blush Pinks Rosy Pinks Deep Rosy Pinks	Margaret Altee	Charm, Agricola. Paradise Comet. Jeannie Gordon, Constance Oliver, Hercules.
Salmon and Orange Tints— Salmon Pinks Orange and Pinkish-Salmons	Helen Lewis	Zarina Spencer, Janet Scott. Edron Beauty, Stirling Stent, Bar- bara, Illuminator.
Orange Scarlets Flakes Various Colours— Pinkish Salmon Flakes Pinkish Cerise Flakes		Saint George. Miss Willmott, Mrs. W. J. Unwin. Mrs. A. Ireland.
Maroon Red Flake		
Carmine Cerise	<u> </u>	Rosabelle, George Herbert, Prince of Wales, John Ingman.
Rose Carmine Pale Lavender Lilac Light Mauvish Lavender		,

Best Sweet Peas, recommended by National Sweet Pea Society of Great Britain.
Bicolour Mrs. Cuthbertson, Arthur Unwin, Mrs. Andrew
Ireland and Colleen.
Blue, Flora Norton Spencer, Mrs. G. Charles and Lord Nelson.
B'ush Mrs. Hardcastle Sykes and Princess Victoria.
Cormine John Ingman.
Crise
Cream Pink (pale)
Burt.
Cream Pink (deep)
Crimson Sunproof Crimson, Maud Holmes and King Edward Spencer.
Fancy Afterglow, Charles Foster and Prince George.
Lavender
Lilac or Pale Mauve Mauve Queen, Winsome and Mrs. R. H. Carrad.
Magenta
Maroon
Maroon Purple Arthur Green and Mrs. J. M. Gerhold.
Maroon Red
Mauve
Orange Pink Edrom Beauty, Helen Grosvenor and Helen Lowis
Orange Scarlet
Picotee Edged (Cream ground)Mrs. C. W. Breadmore and Evelyn Hemus. Picotee Edged (White ground)Elsie Herbert, Marchioness of Tweedale and
Mrs. Townsend.
Pink Elfrida Pearson, Hercules and Countess Spencer.
Rose
Salmon Shades
Scarlet
Striped and Flaked (Chocolate on grey ground). W. R. Beaver and Senator Spencer. Striped and Flaked (Red and Rose)
Striped and Flaked (Red and Rose)
Striped and Fisked (Purple and Blue) Loyalty and Suffragette, White

SOME ADVICE ON SOWING.

The seed of sweet peas, especially the higher priced named varieties, is very variable. Some of it is large and plump, while some of it is small and shrivelled. Most of it, however, will be found to be highly germinable in spite of appearances.

A good garden loam which is neither too sandy nor too heavy is the proper soil for sweet peas. To such soil should be added some well rotted barnyard manure which should be worked in thoroughly a few inches below the ground level. This should be done in the autumn if possible. Before planting the seed, compact the soil thoroughly by tramping or rolling.

The seed may be sown late in the previous autumn if desired, but the practice should not be followed unless good results have previously been attained by so doing. In Eastern Canada April is the month in which sweet pea seed should be sown. At Ottawa the best results have followed when the seed was sown from April 15 to 20.

There are many ways of sowing the seed. A trench may be made about two inches deep and the seed sown in it at regular intervals. At Ottawa the best results have been obtained by means of a simple home-made marker. This contrivance consists of a piece of 2 x 6-inch scantling four feet long. On one side of this scantling a double row of wooden pegs are inserted. The distance between the two rows of pegs is four inches and the distance between the individual pegs three inches. Each peg is about the thickness of a little finger and two inches long, plus an inch

or so for inserting into the scautling. The scantling on the top side is provided with two handles. The method of using it is to take hold of it by means of the handles, lace it in position on the prepared row, and stand on it. The weight of the body will force the pegs their full two inches into the soil. Lift it up carefully and a double row of even depth holes three inches apart will be the result. The peas are then dropped into the holes and a little loose soil from the edge of the row should be raked over them to fill them. By using the back of the rake this may be done very rapidly and thoroughly. At Ottawa every hole is used, as it has been found from experience to be wise to allow for about a fifty per cent loss due to the attacks of birds, cutworms, and similar troubles. In small gardens when full protection might be possible so that every pea survived, it would be wise to thin out every other pea, or every other hole might be skipped at the time of planting. From experiment at Ottawa those peas which do best are those which have an average distance of from 5 to 8 inches between them. In British Columbia as in Great Britain a greater distance even as great as twelve inches seems to be wiser in order to allow for the greater growth of vine. Sowing in a trench, which is filled up gradually as the peas grow, has not shown up to advantage when tested out with other methods.

SOME ADVICE ON GROWING.

Watch, stake, water, spray, are expressions which suggest four lines of activity which must be followed during the growing period of the sweet pea vines.

In the early stages the young peas must be watched to guard them against destruction from birds, cutworms, mice and other enemies, principally cutworms, however. Cutworms may be destroyed when they occur by applying the poison branmash, recommended for many other crops as well, particulars for making which will be found in the spray calendar issued by the Central Farm. Sparrows when trouble-some are kept away by various methods such as netting and poison baits.

Whether wire, brush or trellis work and string be used to support the vines it should be provided for them in the early stages of growth. Vines which have the chance of climbing from the start do very much better than those which are stunted through non-provision of such facilities. A little careful watching at the start will greatly aid them in making their best efforts in climbing in the desired direction. Wind and light both influence the direction in which a vine will climb, and this should be remembered when placing the supports.

In the matter of watering sweet peas it should be kept in mind water may be applied for two very different purposes. First of all they must be well watered during periods of drought, to keep them growing vigorously. In applying water in dry times it is far better to give the ground a thorough soaking once or twice a week than to apply smaller quantities every night. The surrounding earth should be kept well cultivated to a depth of several inches. This will promote healthy growth and save the soil from baking or drying out. The second purpose for which water may be applied is to keep down the attacks of insects, which live on the sap drawn from the foliage, such as green plant lice and the red spider. A thorough spraying of the foliage with as powerful a spray as can be obtained is generally efficient in keeping in check the attacks of these pests. Such spraying may be given every morning or evening in hot weather. A hose and a fine nozzle is all that is necessary, although a spray apparatus may be used to equal advantage.

Where the attacks of these insects have reached a stage when they can be no longer controlled by the water treatment, other spray mixtures must be used, and for this purpose a small spray pump must be used. At the Central Farm it has been found that a nicotine solution, used as recommended in the spray calendar, will effectively control plant lice, Red spiders, however, are much more difficult to control, and if

the weather is very hot and dry their attacks result in serious consequences. Further experiments in this connection are under way. Water, flour paste, sulphur, etc., have given but partial satisfaction up to the present.

With regard to fertilizers for sweet peas, it may be stated that unless one has had previous experience in applying chemical fertilizer it is far safer to rely on the barnyard manure, applied as directed, and careful subsequent treatment. Bone meal, however, may be worked in with the manure if it is deemed necessary.

SOME ADVICE ON SHOWING.

The sweet pea is one of the favourite flowers of the day for exhibiting at local flower shows. In a large number of cases exhibitors are already conscious that to win prices demands as much skill in picking, packing, and showing effectively as it does in growing. Too often well grown sweet peas fail to win a prize because they are not picked or shown properly.

In the matter of picking, it is well to pick them either the evening before the day of the show or very early the same morning. As they are picked they should be stored somewhere in a cool shady place. It is best not to have the water in which they are placed too cool; it is better for it to be quite warm. The place of storage, however, must not be warm nor dry; a damp cellar is a good spot. The reason for this is that in a damp place no evaporation can take place from the flowers themselves, and if the water in which they are placed is warmer than the surroundings, it will flow up the flower stems quickly and prevent the flowers from wilting in the slightest degree.

Care should be exercised in packing them for transit to the show hall, not to crush the blossoms. The basket or box in which they are packed should be kept covered.

The art in showing is to depict the individuality and beauty of a few flowers as much or more than it is to produce effect by massed quantities. When six or twelve blooms are called for by the term of the prize list that number only must be shown, and if they are so arranged that the judge can see at a glance the length of the stem and the number of blossoms to a stem, if other things are equal, it is much more likely that they will receive his consideration for a place amongst the prize winners.

ANNUALS.

In 1912 about 375 varieties of annual flowers were grown from seed procured from various seed firms on this continent and in Europe. In 1913 the number was increased, and in 1914, 500 varieties were under trial. The purpose of growing these flowers has been stated already, but it should be added here that in 1914 the experimental work with them was extended to include the growing of about 100 varieties raised from seed gathered at the Central Farm during the previous summer of 1913. The plants raised from this seed compared favourably in every way with those raised from seed sent out

The seasons at Ottawa are generally favourable for good growth and profuse bloom of most of the annual flowers. This is, of course, also true of many other parts of Canada with respect to these flowers. Annuals, therefore, are probably destined to play no inconsiderable part in the development of the "Beautiful Homes" movement in Canada. Attention was drawn to the fact, in the last annual report, that they possess as a class, many unique advantages, some of which are denied to many of the other classes of flowering plants.

The following notes call attention to several new varieties which were grown at Ottawa for the first time this year. In some cases, no doubt, this means also that it is the first time such plants have been grown in Canada. Amongst the plants of newer introduction there are many, as will be noticed, which have no particularly new merits as garden flowers. Some of the "novelties" of the year also had, as is cenerally the case, very little to recommend them in points of superiority to older and well known flowers.

Following is a list of the best of the newer or little known annuals from those grown during the summer of 1914:—

Abronia umbellata (Sand Verbena).—A plant of trailing habit about 12 inches high, with Verbena-like rose-coloured flowers, very suitable for rock work. In bloom from July 1 to middle of October.

Amaranthus tricolor splendens (Joseph's Coat).—A striking ornamental foliage plant with leaves rather breader than those of the ordinary Amaranthus. The leaves are glowing scarlet crimson with yellow and bronze green. Height, 2½ to 3 feet—rather tender to-frost.

Arctotis grandis (African Daisy).—A half hardy plant growing about 2 feet in height, producing a pleasing and attractive effect in the border; has large white Marguerite-like flowers, each one being very symmetrical in form and having a bluish centre surrounded by a narrow golden band. Unformately, however, the flowers have a habit of closing up during parts of the day which militates somewhat against its usefulness. In bloom from July 10 to middle of October

Calandrinia grandiflora (Rock Purslane).—A handsome hardy annual with fleshy leaves, height about 15 to 18 inches. It bears attractive rose-coloured flowers, but inasmuch as they are produced very sparingly the plant is not so useful as it otherwise would be. In bloom from July 10 to middle of October.

Cleome, Giant Hybrids (Spider Flower).—A tall plant growing from 3 to 4 feet in height. Produces long petaled starry flowers arranged in terminal heads. Flowers are produced in several colours, but mostly shades of pink and purple. Useful for decorative groups in a conservatory, or outside border.

Dahlia, Single Collarette (Seedlings).—Plants make a vigorous growth and attain a height of about 3 feet. Flowers produced in a number of pretty colours, many of them very attractive. These single Dahlias, on account of the ease with which they may be raised from seed sown about the beginning of April, will probably make a great addition to our border plants. In bloom from July 7, till early October.

Dahlia, Double Collarette (Seedlings).—Plants similar to the single varieties and equally vigorous. Flowers produced in mixed colours and of several types, not so attractive on the whole as the single Collarette dahlias, but recommended for certain parts of the garden, especially partially shaded places near fences. In bloom from July 7 until early October.

Eschscholtzias (California Poppies) Hybrids.—Many of the new strains of the Eschscholtzias advertised by many of the seed firms were tested at the Farm during the past summer—amongst these, the new hybrids of recent introduction are particularly pleasing. Many of them in habits of growth, are similar to the regular Eschscholtzias, although in some cases they are very compact or more dwarf in form. As a rule they attain about one foot in height. It is to be expected that, following the introduction of many shades of pink and duplex designs of colour in this easily grown flower, it will attain a much greater degree of popularity during the next few years. In bloom from August 3 till end of October.

Mesembryanthemum tricolor (Fig. Marigold).—A dainty little plant growing about 3 inches high, and very suitable for rock work. It is well adapted for sunry situations and produces crimson and white flowers with a dark centre which, although not large, are quite attractive. In bloom from July 10 till middle of October.

Sedum caeruleum (Stonecrop).—A pretty little rock plant growing about 3 inches high. Flowers pale blue. In bloom from July 26 until middle of October.

Tagetes signata pumila (Dwarf Marigold).—This is a little plant growing about 9 inches high and produces throughout the whole season abundance of orange yellow

flowers. This variety is evidently exactly the same as that reported on last year under the name of Tagetes Golden Gem. In bloom from July 1 until middle of October.

Viscaria, Blue and White Varieties (Rose of Heaven).—A profuse blooming hardy annual growing about one foot high. This special mixture contains blue and white varieties only, which, although pretty, are not so attractive as the variety Cardinalis reported on last year. In bloom from July 15 until end of September.

Chrysanthemum tricolor (Annual Chrysanthemum).—This is one of the larger growing daisy-like type of chrysanthemum. The plant is somewhat large and spreading and attains a height of about two feet. The flowers are tricolour as suggested by its name, many of them are very attractively and somewhat oddly marked. Quite useful for cutting, and the plant is very suitable for borders. In bloom from July 4 till middle of September.

Chrysanthemum, Morning Star (Annual Chrysanthemum).—This is another chrysanthemum of the same type as the former. The flowers are golden or pale yellow and white, attractive and suitable for cutting. In bloom from July 7 till end of September.

Helianthus Miniature (Sunflower).—Free blooming sunflower, described by the raisers as a miniature type. Height about 4 feet and spreading in habit. Flowers are golden yellow with dark centres single and about 3 inches across—rather useful for cutting, although the plant is perhaps more useful for the back of a border. In bloom from July 1 to middle of October.

Perilla nankinensis, Improved.—This is an improved form of Perilla nankinensis. This plant has an attractive dark purple foliage, and is suitable for borders or bedding purposes. It is useful also for growing in the greenhouse. Many distinct types were noticed from those raised from the same packet of seed. Height about 2 feet.

Mathiola (Stocks, Beauty of Nice).—This variety of ten-weeks stock is of very compact form and free flowering in habit. Height about 2 feet and the colour is a pleasing pink. Amongst the many varieties of stock tested this year, this is one of the best, both for compactness and length of blooming season. In bloom from July 1 to middle of October.

Alyssum Benthamii compactum (Lilac Queen).—This variety was sent out as a novelty by one of the large seed firms. It is very compact in form and continuous in its flowering habit, and desirable for those reasons, but in some cases a few of the plants are not fixed in colour, and present a rather dirty white appearance rather than lilac. In bloom from July 1 until end of October.

Browallia elata (Amethyst Plant).—This is rather a well known plant, which did well grown as an annual. It attained a height of about 18 inches and continued in flower for a long season. Useful for borders. In bloom from July 14 to middle of October.

Chrysanthemum (New Single early flowering hybrid).—This is another novelty sent out by one of the large firms, but from comparative tests it appears to be practically the same as the Japanese chrysanthemums which have been grown for some years past. The plant is in many cases able to survive the winters if planted in a sheltered position. The flowers are single and semi-double and on account of their profusion are not so large as could be desired. In bloom from July 21 until early November.

Chrysanthemum (Northern Star).—This is another novelty sent out for the first time this year, and is similar in all respects except that of colour, which is slightly different to the Morning Star variety mentioned above. In bloom from July 14 until end of September.

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Calendula (Pot Marigold).—Several new strains of Calendula were tested this year. The plants are in no way different from those of the ordinary Calendula, although the flowers in many cases are more attractive. Height about 18 inches, flowers produced in great profusion, and very useful for cutting. In bloom from July 3 until end of October.

Centaurea (Moschata roseo) (Sweet Sultan).—This, although sent out as a novelty for the first time this year, is in no way different from Sweet Sultan reported on last year. Centaureas are very useful plants in the border and exceptionally so for cutting purposes; the flowers being produced on long stems and lasting well when cut. These new strains of Centaurea are perhaps among the most useful of all our annual flowers, as they continue in flower and produce abundance of bloom for table decorations late into the month of October.

Lobelia hybrida, Sapphire.—This is a new Lobelia sent out as a novelty this season which has a habit of growth very similar to the Tenuior types. It grows from 9 to 12 inches tall with a somewhat spreading habit. The flowers are extremely attractive, being a brilliant blue with a white centre. It will probably be found that this will be a very popular type for window box work as it is certainly a great addition to the Lobelias. In bloom from July 1st to beginning of October.

Schizanthus grandiflorus maximus (Butterfly Flower).—This variety was sent out as a novelty this season and was grown amongst the other varieties of Schizanthus for comparative test. It did not, however, appear to be any better than many of the regular and older types. July 7 till September 1st.

Antirrhinum, Double White (Snapdragon).—Sent out as a novelty this season. One of the best of the medium height, double white snapdragons. In bloom from July 15 till middle of October.

Stocks (One and All New White).—A good white variety sent out as a novelty this season. Recommended. In bloom from July 14 until end of October.

The following plants were those which in 1914 were considered to be of secondrate, or even less importance when compared with those just listed and the many other well known flowers which were grown in the test plots with them. All plants were grown under uniform conditions and complete notes recorded on the length of their flowering season, height, hardiness, flowering habits, etc.

Adonis aestivalis (Pheasant's Eye) .-- Pretty, but season of bloom is too short.

Anagallis (Pimpernel).—Of easy culture, but too weedy in appearance.

Asperula azurea setosa (Woodruff).—A rather attractive little plant producing an abundance of blue flowers.

Collomia coccinea.—Is in bloom for a short season only and has no special merit.

Diascia Barbarae.—Rather attractive but does not make any show until too late in the season. Eutoca viscida.—Produces flowers of a beautiful blue but the plant itself is too weedy in

Gamolepsis Tagetes.—Early flowering and pretty but season of bloom is over too soon.

Gilia mixed varieties.—Dainty free flowering little plants, suitable for rock gardening.

Hibiscus africanus major.—Individual flowers attractive but do not last. Plants rather

unattractive.

Inopsidium acaule.—A neat little dwarf plant for shady places in the rock garden.

Layia elegans (Tidy Tips).—Pretty yellow flowers fringed white plants dwarf and somewhat spreading.

Limnanthes Douglasti.—Yellow flowers and fragrant. A good flower for the bees.

Loasa aurantiaca.—A trailing plant flowering rather late in the season. No special merits.

Mathiola bicernis.—(Night scented Stock).—Flowers not large enough to be attractive, plants scraggly.

Phacelia campunularia.—Seed should be sown in the open like Poppy seed. Flowers of a very beautiful blue but rather small.

Salvia splendens bicolor.—Not so attractive as the better known scarlet "Fireball" varieties. Tagetes lucida.—Plant straggly and flowers not attractive.

Xeranthemum, mixed, (Immortelle).—Useful Everlasting annuals, but no effective colours.

Nicotiana sylvestris.—A bold plant five feet high, flowers in spikes. Less attractive than Allinis.

Salvia Blue Beard .- A useful plant for autumn effects.

A list of annuals which continue in bloom late into the autumn and are recommended for use in perennial borders and for autumn effects:—

Low Growing-Antirrhinum Dwarf, Brachycome, Nemesia. Chrysanthemum Bridal Robe. Tagetes signata pumila. Eschscholtzia, Verbena. Lobelia tenuior. Medium Height-· · Linum, Acroclinium. : Limnanthes Douglasii, Petunia. Antirrhinum. Alonsoa Warscewiczii. Phlox Drummondii, Stocks Ten-Weeks, Salvia Blue Beard. Annual Chrysanthemum, Asters. Calendula, Gaillardia (Annual). Tall-Cosmos. . Nicotiana. Helichrysums, Sweet Sultan. Helianthus, Larkspurs, Tall varieties, Scabiosa. Salpiglossis.

On Oc.o' er 6, 1914, all of these annuals were still making a good show of flowers and had received no injury from several slight frosts previous to that date.

GOOD ANNUALS TO GROW FOR CUT FLOWERS.

China Asters.
Sweet Peas.
Nasturtiums.
Sweet Sultan (Centaurea).
Pin Cushion Flower (Sweet Scabious.)
Single Collarette Dahlias.
Ten-Weeks Stocks.

Mignonette.
Snapdragons.
Everlastings.
Zinnias.
Callopsis or Annual Coreopsis.
Gladioli,
'Pansies.

USEFUL FERNS, PALMS, AND OTHER EASILY GROWN FOLIAGE PLANTS, FOR HOUSE OR CONSERVATORY.

A large number of inquiries reach the Central Farm with respect to the care of house plants. The following notes on varieties, and suitable care of some of the commoner or easily grown foliage plants, give such information as is generally supplied in answer to many such inquiries.

Ferns.—Ferns grow best in a temperature ranging from 45 to 55 or 60 degrees Fahr, in winter and from 50 to 70 degrees Fahr, in summer. The following are varieties which are most generally grown and do best when grown under house conditions:—

ties which are most generally grown and do best when grown under house conditions:—
Common Name. Botanical Name.
Sword Ferns and the Boston Ferns
Maiden-hair Ferns
Spider Ferns or Brake
Holly Fern
Male Fern
Hart's Tongue Fern
Lady Fern Asplenium Filix-famina, lucidum and marinum.
Polypody Polypodium vulgare cambricum and dryopteris.
No common name
" Nephrodium molle.
" " Osmunda japonica and palustris.
" " Lomaria alpina and chilensis,
" Polystichum angulare and aculeatum.
Davallia Mariesii and others used for fern balls.

Brief Notes on the Care of Ferns.—Ferns grown in the house should be repotted every year or every second year in order to keep them growing healthily. Such repotting should be done in the spring, in either March or April. When repotting remove some of the old fronds (leaves) and some of the soil from the roots. Do not disturb the roots too much. Place some drainage in the new pot in the shape of pieces of broken flower pots or small stones. Add a little soil, but only enough to raise the fern, when replaced in the pot, to its proper height. Then work in some good fibrous loam and leaf mould, using the fingers or a small stick to pack it firmly around the roots. When potting is properly done about an inch of space will be left without soil at the top of the pot. This space is very necessary otherwise it is impossible to water ferns properly.

Watering should be done every day, or every second day. In dry rooms, especially those heated in the winter with hot air or steam, daily watering is frequently necessary. Ferns should not stand in pans of water, but it is a good practice to stand pans of water on the radiator or near the plants in order to keep the atmosphere from becoming too dry. As a rule ferns do not do well in rooms and the main reason is that the air becomes too dry for them, quite unlike that to which they are accustomed in their habitat in shady woods. Draughts and excessive changes of temperature also work injury to the ferns. On the other hand they will be benefited by fresh air from an

open window on a warm day, even in winter.

Moisture in the atmosphere of the room, careful and sufficient watering, as even a temperature as possible, and some fresh air, are four points which must not be neglected if ferns are to be grown successfully.

Additional factors which make all the difference between success and failure are, first, with regard to the best time to water. Water in the morning if possible, and water regularly. Should the soil be wet and codden looking when the watering is done the plants are getting too much water. The remedy is to water every second or third day instead of every day. On the other hand, should the soil be quite dry and hard it is a sign that water is not given often enough. The remedy is to water everyday, and apply enough so that it reaches to the bottom of the pot. The second important thing to remember is to choose the right kind of fern. Maiden-hair ferns are not so suitable for dry rooms as the Boston, Brake and other ferns. The leaves of the former are very delicate and wither very soon if they are brought from a moist greenhouse to a room.

In some cases the drying up of the fronds of hardy ferns suggest that they are in need of a rest period similar to that which they have in natural conditions during the winter. Old ferns, in particular, are apt to show such signs. To restore them to vigor and health give them a few months rest in a cool room. Withold water from them, applying it only about once a week, and allow some of the fronds to die off. Then repot in the spring as described above.

A general sickly appearance as well as insect troubles may be caused partly by neglect of the above rules of good culture, and partly by improper soil and lack of ventilation. The best soil for ferns is one made by mixing in about equal parts some good fibrous loam, some leaf mould or peat, and some sand or sandy soil.

Palms.—Palms are not difficult plants for house culture, and the following eight or nine are among the best:—

Thatched-leaf palm. Kentia Belmorcana.
Curly palm. Kentia Fosteriana.
Feather-leaved palm. Phanix Roebelenii and sylvestris.
Cocos Weddelliana.
Fan-leaved palm. Chamerops humilis.
Livistona rotundifolia.
Chinese leaved palm. Latania Borbonica.
Australian feather palm. Seaforthia elegans, Areca lutescens.

Palms to do best should be given partial shade in summer, and plenty of water. Under these conditions they will withstand a fairly high temperature, but will do better in a cool room where the temperature does not exceed 65 or 70 degrees. In winter the temperature should average between 45 and 60 degrees and the air should not be allowed to become dry. Moderate watering only should be given in winter and water should never accumulate in the pans or jardinieres in which the pots are placed. Keep the leaves clean by washing with soapy water.

Palms naturally grow very slowly and therefore do not seek to over stimulate or burry their growth. Repot about once a year when young as for ferns, but after they have attained a good size repotting will not be necessary. When repotting do not disturb the roots, and handle carefully. Use good garden loam together with plenty of drainage material in the bottom of the pot.

Other Foliage Plants.—Of a large number of ornamental plants which are useful to produce pleasing impressions by means of their foliage rather than their flowers, the following are given and briefly described as those which are best suited for culture in the ordinary house.

Flowering plants such as Geraniums, Chrysanthemums, etc., will be dealt with another year, but these foliage plants are added to the Ferns and Palms to make the list of this type as complete as possible.

Ficus elastica (Common Rubber Plant).—A very simple plant to grow and does well in the ordinary house. Perhaps the most popular of all foliage plants for home use. Pot in rich soil and keep well watered; do not water in excess in the winter. May be propagated by "topping" the old plant or by a method of gradually severing the top of the plant so that it forms roots at the cut part.

Pandanus (Screw Pine).—A favourite decorative plant, easily grown. The leaves come out spirally and curve down gracefully. Soil should be of a fairly light type. Give plenty of water in the summer and only a moderate amount in winter. Propagated by suckers from the base of the old plant.

Anthericum variegatum.—An attractive ornamental foliage plant, with strap-like curving leaves striped with white. Propagated by dividing the parent plant. Of easy culture.

Asnaragus, Ornamental (Asparagus Fern).—Well known, attractive and of easy culture. Does best in a temperature of 55 to 60 in winter and 60 to 75 in summer. Water liberally. Propagated by seeds or cuttings.

Aspidistra (Parlour Palm).—A plant which will withstand poor conditions better than most plants. The variegated leaved variety is attractive. Propagated by dividing the parent plant in spring.

Begonia, Ornamental-leaved varieties.—Handsome foliage plants requiring fairly warm treatment, with a moderate amount of water in winter and a free supply during the summer. Propagated from leaf cuttings.

Coleus.—Ifandsome, rapid growing foliage plants of extremely easy culture, but more suited for summer than winter culture. Propagated from cuttings or seed.

Cyperus (Umbrella Plant).—A healthy easily grown plant adapted for room culture. Propagated from seed or by dividing the parent plant.

Dracaena (Cordyline).—Handsome foliage plants, many with coloured leaves. Should be kept shaded from bright sunshine. Does best in warm temperature. Propagated from seed or cuttings.

Farfugium (Spotted Colt's Foot) .- A foliage plant of early culture with dark green leaves blotched with yellow, white or rose. Does well in shade as well as in the sun. Propagated by division of the plant in the spring.

Funkia (Plantain Lily).—The smaller varieties make very good pot plants. They need rather large pots and should be repotted in March. Water freely from March to October. Propagated by dividing the roots in spring.

Grevillea (Silk-bark Oak).—A plant with fern like foliage of a shrubby nature. Requires careful watering and a good supply of air in summer. Some flowers are produced by several varieties of Grevillea. Propagated by seeds and cuttings.

PLANTS SUITABLE FOR ROCK GARDENS.

Hardy at Ottawa.

Anemone sylvestris and patens Nutalliana. Aethicnema coridifolium and grandiflorum. Adonis vernalis.

Alyssum saxatile.

Aquilegia chrysantha nana and olympica

Arabis albida and alpina.

Armeria mari'ima.

Aster alpinus superbus.

Campanula carpatica, and Fergusonii, Dianthus caesius, deltoides glaucus and mon-

Epimedium alpinum rubrum, and pinnatum.

Heuchera brizoides gracillima, sanguinea and

Iberis sempervirens fl. pl. and Snowflake.

Iris cristata and verna.

Me tensia pulmonarioides Myosotis alpestris Victoria.

Papaver nudicaule, alpinum, and umbrosum. Pentstemon barbatus (for special effects). Phlox subulata and divaricata. Primula, hardy hybrids when given slight

Sedum spectabilis.

Statice elegans.

Trollius europaus. Viola Zovi and others.

Suitable Dwarf Shrubs.

Cytisus purgans and varieties.

Daphne Cneorum.

Kerria japonica variogala (winterkills at tips).

For particulars as to heights, etc., of most of the above, see bulletin No. 5,

TREES AND SHRUBS FOR SANDY SOILS.

Manitoba Maple. Birches, White and Paper. Honey Locust. Poplars or Cottonwood. Pin and Red Oaks

Willows, several varieties.

Rock Elm. Jack Pine.

Small Trees-

Tartarian Maple. Siberian Pea Tree.

Shrubs-

June Berry. Dogwoods.

Wolf Willow

Sea Buckthorn. Matrimony Vine. Shrubby Cinque-foil.

Sand Cherry.

Buckthorn.

Fragrant Sumach, Missouri Currant.

· Buffalo Berry. Spiræa, several varieties.

Snowberry.

Botanical Names.

Acer Negundo.

Gleditschia triacanthos,

Populus.

Ulmus racemosa. Pinus Banksiana. Pinus sylvestris.

Acer tataricum. Caragana arborescens,

Cratagus.

Amelanchier.

Amorpha fruticosa.

Cornus. Elwagnus argentca.

Hippophæ rhamnoides.

Lycium cureprus Potentilla fruticosa.

Prunus pumila, Rhamnus cathartica.

Rhus aromatica trilobata.

Ribes aureum. Shepherdia argentea.

Symphoricarpus.

TREES AND SHRUBS FOR SHADY PLACES.

Trees which will succeed in shady places.

DECIDEOUS .-

American Beech Sugar Maple Box Elder (Manitoba Maple) Russian Mulberry Wild Black Cherry

EVERGREEN .-

Hemlock Arbor-Vitae Douglas Fir Spruce Japanese Yew.

SHRUBS WHICH WILL SUCCEED IN SHADY PLACES.

Privets of different species (Ligustrum).

Viburuum of different species, including Guelder Rose, or High Bush Cranberry.

These are among the best.

Buckthorns.
Dogwoods (Cornus).
Deutzia.

Hydrangea arborescens.
Clethra alnifolia.
Witch Hazel.
Oregon Grape (Berberis Aquifolium).

ORNAMENTAL SHRUBS AND TREES PRODUCING SUMMER FRUITS OR WINTER BERRIES, ATTRACTIVE TO BIRDS, AND HARDY AT OTTAWA, CANADA.

Common Name. Botanical Nam	Best for Persistent fruit or Winter berries.
Berbeiries Berbeis	

SOME USEFUL HINTS FOR ALL PURPOSES.

Although most of the following vines may be used to good effect under many circumstances, they are here classified into six groups to indicate in a simple way which vines are most suitable for certain specific purposes:—

1. On the House-

Virginian Creeper, self-fastening variety. This is generally catalogued as Ampelopsis quinquefolia hirsuta or Engelmannii, but these two are distinct.

Boston Ivy, where hardy. Does best on north or west side of house.

English Ivy """"

Trumpet Vine """"

Kudzu Vine, where hardy.

2. For the Verandah or Porch-

Dutchman's Pipe Vine. Climbing Bitter Sweet. Jackman's Large Flowered Clematis. Scarlet Trumpet Honeysuckle. Wistaria, where hardy.

3. Most suitable for Arches-

Roses—Crimson, Rambler, Dorothy Perkins, American Pillar, Akebia quinata.
Clematis,

4. For the Pergola-

Trumpet Vine.
Actividia arguta.
Wistarias, where hardy.
Roses.
Wild Grape Vine.

5. For Fences-

Matrimony Vine. Virgin's Bower (Clematis). Honeysuckles.

6. For Screens-

Any of the large leaved vines amongst the above are suitable. Also annual vines such as—
Tall Growing Nasturtiums.
Cup and Saucer Vine.
Canary-bird Vine.
Eccremocaryus.

PLANT BREEDING.

(A. J. LOGSDAIL, B.S.A., Assistant in Charge.)

It was found convenient to divide the report of the work in connection with horticultural plant breeding during the year 1913 into three main divisions, Pomology, Olericulture, and Floriculture. A similar division of the work will be followed for the report of the past year of 1914.

POMOLOGY.

The plant breeding work in Pomology and more particularly that in connection with apples, consisted of the care of the scedling crosses made during former seasons and now growing in the nursery row, and also the securing of further seedlings by making new crosses on the crop of the current year. The object in these crosses was to secure, if possible, a heavy yielding, long keeping apple of good quality, that would begin to bear fruit at an early age, such as the Wealthy or Wagener.

The varieties used in this work included several of the most promising seedlings produced at the Central Experimental Farm together with several well known varieties possessing desirable characteristics. Amongst the most important seedlings employed in this work may be mentioned: Danville (Lawver seedling), Glenton (Northern Spy seedling), Bingo (Northern Spy seedling), Rouleau (Salome seedling), Cobalt (Lawver seedling), Crusoc (Wealthy seedling), Rosalie (Northern Spy seedling), Niobe (Northern Spy seedling).

The season proved to be very favourable for this work and a fairly large percentage of fruit was obtained and the seed from these crosses was sown for spring germination.

The following is a list of the crosses made with apple varieties:-

 18.23
 Danville F.
 x
 Wealthy M.

 18.24
 Glenton F.
 x
 Wealthy M.

 18.25
 Rouleau F.
 x
 Wealthy M.

 18.26
 Bingo F.
 x
 Wealthy M.

18.28 Cobalt F. x Duchess of Oldenburg M.

18-29 Crusoe F. x Cobalt M.

18 31 Crusoe F. x Duchess of Oldenburg M.

 18·32
 Niobe F.
 x Crusoe M.

 18·33
 Niobe F.
 x Wealthy M.

 18·34
 Rosalie F.
 x Crusoe M.

18.35 Rosalie F. x Wealthy M. 48.36 Wealthy F. x McIntosh Red M.

18 37 Wealthy F. x Duchess of Oldenburg M.

18.39 McIntosh Red F. x Wealthy M.

N.B.—The letter "F" denotes the female parent, or tree upon which the fruit was produced, and the letter "M" denotes the male parent or the tree from which pollen was secured.

PEARS.

The breeding work with pears was a continuation of that inaugurated during the previous season. The object of this work was to secure, if possible, a hardy pear, reasonably blight proof, and of a good edible quality.

The pears Gliva Kurskaya, Zuckerbirn and Lemon Pear are of Russian origin. These pears have proved hardy at Ottawa, have grown vigorously and have suffered but little from blight, whereas the other varieties, consisting of well known commercial sorts, have all been, without exception, either destroyed by the rigours of climate or the ravages of pear blight.

Pollen was secured from the best of our commercial varieties of pears growing in more southerly sections, and was used on the hardy Russian varieties in the Central Experimental Farm orchards. Owing to favourable climatic conditions, we were able to secure a considerably larger amount of seed than was secured during last year on similar work.

The following is a list of crosses made with varieties of pears:-

16.23 Gliva Kurskaya F. x Flemish Beauty M.

16.24 Gliva Kurskaya F. x Clapp Favourite M.

Seckel M. 16.25 Zuckerbirn F.

x Clapp Favourite M. 16.96 Zuckerhirn F. 16 27 Lemon Pear F. Clapp Favourite M.

16.28 Lemon Pear F. Anion M. X

The fruit from these crosses matured and was collected on August 17, and a few days afterwards the seed was sown for spring germination.

A quantity of seed of grapes of Labruscan origin, namely, Moore Early, Concord, Worden, Vergennes and Champion, and also seed of the varieties of Hybrid Labruscan and Viniferan origin, namely, Campbell Early, Brighton, Niagara, Salem and Daisy, were sown during the autumn of 1912. The seed germinated to a large extent during the spring of 1913, but further seedlings appeared in the seed beds during the spring of 1914. These young grapes have been transplanted to the nursery row and are now requiring further room. It is the intention to carry on this work with grapes under more favourable circumstances of both soil and climate at the Experimental Station at Lennoxville, in the southern part of Quebec. The seedlings will be planted in the grapery at this Experimental Station in the spring of 1915, and there fruited.

Last year a collection was made of native geographical species of strawberries from several localities throughout the Dominion. Wild strawberries were secured from Fredericton, N.B.; Ottawa Valley, Ont.; Niagara District, Ont.; Golden, B.C.; Nelson, B.C., and a species from South Dakota. Besides these, were grown several of our best commercial varieties such as Pocomoke, Williams, Senator Dunlau. William Belt, and Bubach, together with several of the best strawberry seedlings produced at the Central Experimental Farm.

During the past season a number of crosses were made between the native species and the commercial varieties. Following is a list of the crosses made:-

10.31 Fragaria Virginiana (Eastern Ontario) x William Belt.

10.32 Fragaria vesca (Eastern Ontario) x Bubach.

10.33 Portia (William Belt Seedling) x Fragaria Virginiana (South Dakota).

10.34 Fragaria (Golden, B.C.) x Senator Dunlap.

10.35 Valeria (Bubach seedling) x Fragaria Virginiana (Southern Ontario).

10.36 William Belt seedling No. 5 x Fragaria Virginiana (Southern Ontario).

The seed from these crosses was sown in seed boxes and the plants are now growing freely, and though quite small will be ready for field planting in the spring.

Record should here be made of a wild strawberry received during the past summer from Mr. A. II. Tomlinson, of the Department of Agriculture, British Columbia, which was found by him growing on the Queen Charlotte Islands, longitude 132, latitude 53.4. It is highly spoken of by him as a wild species, and it is hoped that we may be able to use it in our strawberry breeding work.

OLERICULTURE.

VEGETABLES.

The work with vegetables consisted very largely in breeding work with varieties of corn, varieties of peas, beans, and strains of tomato. A little work was carried on

with potatoes and preparatory work with onions.

Corn.—During the summers of 1912-13, careful records were made of the merits of several strains of Early Malcolm Sweet Corn, and by eliminating the poorest strains, seed was secured for future work and for distribution to experimenters. The strains that were selected for future work at the close of the season of 1913, were grown (during the past season) in close proximity to each other with the object of crossing the best of them to increase vigour, if possible, and avoid the evil effects of the close inbreeding of corn.

The crop was somewhat earlier than last year, and the seed better matured, but on the average, the yield was not so large, though the quality of the crop showed a slight improvement.

Besides the selection work with these strains of Early Malcolm Sweet Corn, a number of crosses had been made during the season of 1913, and these were grown for

the F, generation.

The crosses were: Early Adams (dent) x Early Malcolm (sweet); White Squaw (flint) x Early Malcolm (sweet); and Red Squaw (flint) x Early Malcolm (sweet).

In the ears secured from the Early Adams plants that had been pollinated with Early Malcolm and also with the plants of White and Red Squaw, similarly pollinated

with Early Malcolm, several forms of ears were clearly noticeable.

In the Early Adams, several ears were found in which about 60 per cent of the kernels appeared like the pure seed of the Early Adams; the remaining 40 per cent of the seed was wrinkled and semi-translucent, a good deal resembling the kernels of Early Malcolm. As all the tassels of the Early Adams plants had been removed no pollen of Early Adams could possibly have been produced. The appearance of these two forms of grain on the one ear was an illustration of the well-known phenomenon "Xenia." Xenia may be thus explained: if, for instance, pollen from a round corn is blown on to a wrinkled or sugar corn, round seeds will be formed amongst the normally wrinkled seeds on the ear growing on the sugar corn plants.

Another form of ear was found more commonly on the plants of Early Adams thus crossed with Early Malcolm. This type of ear represented more or less a blend of the characteristics of the opaque, dented seeds of the Early Adams, and the semi-translucent wrinkled seeds of the Early Malcolm. In these ears possessing the blended characteristics, none of the seed was either dented or wrinkled, but it was clearly semi-translucent and flint in form. It was deemed advisable to sow the several types of seed separately; one ear possessing the two forms of kernels was chosen and the wrinkled grain was sown in isolation, from the dented grain.

A similar amount of seed from one of the ears possessing the blended form of grain was also sown.

The crops during the past season from these three types of seed have been most marked. The wrinkled seed yielded a crop of large uniform ears, only 5 per cent of which were in appearance similar to the Early Adams seed, and 95 per cent had all the characteristics of a true sweet corn. The dented opaque seed yielded the heaviest crop, all were large 12-rowed well-filled ears with 64 per cent of dented seed and 36 per cent of wrinkled or sweet corn seed.

The seed possessing the blended characteristics yielded a very uneven crop, many of the ears being long and 8-rowed, some being short and 14-rowed, the majority varying between 10- and 12-rowed. The grain consisted of 75 per cent of dented or semi-dented seed and 25 per cent of wrinkled sugar seed. The result of this work with the cross, Early Adams (dent) x Early Malcolm (sweet), seemed to be that the wrinkled grain of an ear of corn, showing xenia, will produce in the F₁ generation, progeny

almost entirely true to the type of the grain sown, namely, sweet corn.

In the cross between the flint Squaw corn and the sweet Early Malcolm, similar segregation of grain was made, but the results were by no means similar to those obtained with Early Adams. The wrinkled kernels yielded a crop practically half of which consisted of wrinkled seed and half of flint corn seed. There was a slight increase in the proportion of wrinkled grain in the crop from wrinkled seed over that of the other two forms of seed, namely: the entirely opaque and semi-translucent. Whether different results are always to be met with in crossing a dent corn with a sweet to those when crossing a flint corn with a sweet, can only be determined by more work and more data than we now have available. Nevertheless, the work so far has produced a very promising new type of sweet corn and there are further types within sight.

The object of this crossing has been to produce a sweet corn that will combine the

potent characteristics of the varieties here mentioned.

Experimental Farm, and though only a moderate yielder, it produces a medium sized, fairly uniform ear. The Squaw corn, so called because it was first found in possession of the Mandan Indians of North Dakota, is a dwarf, free stooling variety of flint corn, its most marked characteristic being its ability to grow in cooler temperatures than any other corn. On several occasions when the growing season has been somewhat cooler than usual, the Squaw corn has matured and ripened a full crop of grain in northern localities where the Early Malcolm has been severely checked and has completely failed to mature a crop. This characteristic of hardiness should be of extreme value in the production of early maturing varieties of sweet corn, if it can be transmitted to the new strains produced.

The crosses that have been worked with are as follows:--

25-31—Early Adams F. x Early Malcolm.—(Wrinkled grain in appearance like Malcolm, from an ear of Early Adams.)

25 32—Early Adams F. x Early Malcolm M.—(Dented opaque, seeds like pure Early Adams, from the same ear as 25.31.)

25.33—Early Adams F. x Early Malcolm M.—(Neither dented, opaque or wrinkled, but semi-translucent, and flint in form.)

25-34—Early Adams F. x Early Malcolm M.—(Neither dented, opaque or wrinkled, but semi-translucent, and flint in form, from same ear as 25.33.)

25.35—Early Adams F. x Early Malcolm M.—(The whole car and kernels appeared as pure Early Adams, dented and opaque.)

25.36-White Squaw F. x Early Malcolm M.—(Seed wrinkled like Malakoff, but grown on an ear of Squaw).

25.37—White Squaw F. x Early Malcolm M.—(Seed flint and opaque like Squaw corn, grown on same ear as 25.36.)

25-38—White Squaw F. x Early Malcolm M.—(Seed semi-translucent, not wrinkled, but like flint in appearance.)

25-39—White Squaw F. x Early Mylcolm M.—(Seed opaque and flint, like pure White Squaw.)

25.41—Red Squaw F. x Early Malcolm M.—(Seed red in colour, but wrinkled like Malakoff, grown on a'red Squaw ear.)

25.42—Red Squaw F. x Early Malcolm M.—(Seed red, and opaque and flint in form, like pure red Squaw, from same ear as 25.41.)

25.43—Red Squaw F. x Early Malcolm M.—(Seed like Red Squaw, selected for intensity of colour and size of kernel.)

25.44—Red Squaw F. x Early Malcolm M.—(Seed similar to 25.43.)

With regard to the crosses 25.41 and 25.42, the seed in both instances was red, but the crop produced this year gave in the cross 25.41 33 per cent of red ears and 66 per cent of white ears. The cross 25.42 gave 50 per cent of red ears and 50 per cent of white ears.

Tomatoes.—The plant breeding work during the past season in connection with tomatoes has been the further selection of strains of Alacrity tomato grown at the Farm for some years past. The origin of the Alacrity is the Earliana Tomato, which has been selected for earliness, smoothness, uniformity, and as far as possible, yield.

The object in the selection work is to secure, if possible, a strain of tomato that will produce a large proportion of its crop in the first two weeks of fruiting, and, if possible, practically the whole of its crop within the first month. Several strains of Alacrity have already been secured that are showing a decided tendency towards early fruiting.

Many early varieties of tomatoes produce scattered ripe fruit in small quantities for several weeks prior to the commencement of the real crop, this scattered fruit often comprising less than three per cent of the total crop of the variety, and ripening irregularly during a period of two or three weeks, from late July into early August. If a really early bearing variety could be secured which would yield 20 or 30 per cent of its total crop during this period of the season, it would be a good paying proposition for many localities. If the variety in question produced a relatively light total yield, it would be a better paying proposition than a heavier yielding variety maturing a greater portion of its crop during late August and early September.

During the past season twenty isolated strains of Alacrity were planted, about one-sixtieth of an acre of each. A record of these several strains was carefully kept, and the following table gives the results of these several strains and their relative

merit, as compared with the average of the strains as a whole.

STRAINS of Alacrity Tomato.

Record Number.	Date Sown.	Planted Out.	First Picking.	Last Picking.	Grop for First. two Weeks.	Percentage of Total Crop.	Total Crop for one Month.	Average of all Strains.
23-11 23-12 23-13 23-14 23-15 23-21 23-22 23-23 23-24 23-25 23-31 23-32 23-31 23-32 23-31 23-32 23-31 23-32 23-41 23-42 23-41	4-4 4-4 4-4 4-4 4-4 5-4 5-4 5-4 5-4 4-9	1-6 1-6 1-6 1-6 1-6 1-6 1-6 1-6 1-6 1-6	August 1 July 29 29 29 29 20 July 29 27 27 27 27 27 27 27 27 27 29 27 July 27 1 July 27 1 July 27 29 27 29 29 29 29 27	August 28 28 28 28 28 28 27 27 27 27 27 28 28 28 28 28 28 28 28 28 28 28 28 28 21 24 24 24	Lb. Oz. 12 14 20 8 12 1 26 10 20 11 14 7 15 10 16 15 13 12 11 2 13 15 12 1 11 2 6 4 7 13 8 1 3 14 4 15	27.5 7.3 5.5 11.3 8.7 8.7 8.5 7.9 5.7 5.7 5.7 5.7 5.8 4.7 9.5 4.7 9.5 4.3 7.2	Lb. Oz. 46 14 278 14 219 9 230 7 235 12 171 7 164 10 232 15 203 4 193 5 183 0 185 9 178 1 126 12 164 13 84 9 84 4 68 15	Lb. Oz. 190 3 190 3 190 3 190 3 190 3 190 3 190 3 190 3 190 3 190 3 190 3 190 3 190 3 190 3 190 3 190 3 190 3 190 3 190 3

Owing to the elimination each season of strains that have not proved equal to or better than the average, the standard of elimination is gradually being raised, and is considerably higher this year than the average during the season of 1913. Nevertheless, there are several strains maintaining the high average throughout, as regards yield, earliness of crop and comparative smoothness of fruit.

A considerable quantity of seed from these strains was saved during the past season for distribution to experimenters. Owing to the favourable reports received from the seed sent out during 1913, it is desired to keep up and extend this work of seed distribution as it is evidently being very favourably received by experimenters and co-operators in this work.

It should be mentioned that this work in connection with seed improvement can be materially assisted by the co-operation of individual experimenters in different localities throughout the Dominion, and our thanks are due to several hundred such experimenters, who have received seed from us during the past two seasons, and have reported on the merits or demerits of the seed sent to them. By the able co-operation of a number of such experimenters, we are able to determine those localities or districts to which seed produced at Ottawa seems more particularly suited. Similarly, we are able to determine those localities where the climatic conditions do not seem to be suitable for seed originated at the Central Experimental Farm.

During the spring of 1914 a large number of samples of corn, tomatoes, and garden peas, comprising in all about 2,000 packets, were sent out to experimenters in all the provinces.

The reports received during the latter part of 1914 and the early portion of 1915 refer to seed tested during the summer of 1914. Of 428 reports 266 consider the seed of first-rate quality, and of economic value; 53 report that they possess better varieties, and 95 report failure due to early autumn frosts or drought.

The following table gives a summary, by provinces, of the reports received with reference to seed of Early Malcolm sweet corn and Alacrity tomato, sent out by the Horticultural Division of the Central Experimental Farm:—

SUMMARY of Reports received in connection with Seed Distribution, 1914.

SWEET CORN-EARLY MALCOLM.

Provinces.	Good.	Indifferent.	Poor.	Frost.	Drought.	Accident.	Total.
Maritime ProvincesQuebec	.19 30 30 7 12 18 12 ——————————————————————————————	2 0 3 1 3 1 1	3 2 2 2 4 4 1	0 1 0 0 9 3 13	1 2 0 2 9 6 4	1 1 1 0 2 3 1	26 36 36 12 39 35 32
		TOMATO '	"ALACRIT	Υ.,			
Maritime Provinces. Quebe: Onterrio Manitoba Saskatchewan Alberta British Columbia. Total	16 31 31 10 19 18 13 13	1 2 3 0 1 1 2	2° 1 5 1 1 3 1 1 14	2 3 1 2 7 5 11 	1 0 0 7 4 1	1 1 0 0 1 2 0	23 39 40 13 36 33 28

MELONS.

During the late spring and early summer, a considerable amount of crossing was successfully undertaken with melons, particularly between the Montreal Market and several of the best of the English greenhouse varieties such as Sutton Superlative, Barnett Hill Favourite and Hero of Lockings. The well-known varieties of Paul Rose, Emerald Gem, Early Hackensack and Rocky Ford were also crossed with the above mentioned English varieties.

Seed of these crosses was saved and sown in the autumn for a greenhouse crop. The germination of the seed from these crosses was most irregular. As the greenhouses were new and the succession of crops not yet worked out satisfactorily, this crop did not receive the attention that it required, and proved a failure in consequence. Similar circumstances injured a crop of tomatoes that it was attempted to grow. The melon plants were the result of the summer season's selection and crossing and had the conditions permitted of their successful growth, the greenhouse crop would have accelerated the work in hand. A melon, to be grown successfully under glass in the fall of the year, should be started at an early date so that the plants will have the advantage of the long and sumy days of the latter part of August and early September.

Fortunately some seed of several of the melon crosses had been saved and this seed has recently been sown for a spring crop under glass. It is hoped that from these crosses some plants may be isolated that may prove of commercial value.

The addition of new greenhouses to the Horticultural Division will be of special assistance to the plant-breeding work. There is no branch of horticultural work where the saving of time is of such vital consequence, and with glass space now available it is hoped that much of the work can be accelerated by growing the first generation of crosses made with certain annual crops during the summer previous and

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thereby obtain seed of the second generation for the following summer which of necessity must be grown on a more extensive scale under field conditions.

A crop of sweet corn was grown under glass during the winter months and several crosses were made, the seed which matured satisfactorily will be ready for sowing during the coming season.

GOOSEBERRIES.

No particular line of work has yet been undertaken with gooseberries, but at the Central Experimental Farm there are several hundred gooseberry seedlings under observation and these should fruit during the season of 1915 or 1916 at the latest. These seedlings are in the main from seed of crosses between Ribes oryacanthoides, a smooth berried gooseberry of our native woods and Ribes Grossularia. Though nothing worthy of note has yet been seen amongst these plants, the seedlings as a whole have shown wide variations in habit of growth and type and form of variety.

PEAS.

A considerable amount of work has been devoted to garden peas and the results to date as evidenced by carefully collected records show that the attention given to this crop has been fully merited. The work has consisted in isolating strains of several varieties of pea and by the evidence of records of yield and vigour the undesirable plants have been eliminated and the very best have been saved for further work, the progeny of each individual having been carefully isolated so that no intermingling of progeny might occur and thereby destroy the information being collected on the merits of individual strains.

The season of 1914 was an exceptionally good one for garden peas at the Central Experimental Farm. The varieties, moreover, were grown on soil peculiarly adapted to this crop and the general average of improvement over that of the previous season amounted to approximately 45 per cent of the 1914 yield. Several varieties have been grown from year to year without any particular selection except that of securing sound seed for using each season, but this work has been maintained so that it might act as a cheek on the results being obtained with individual plant selection in the other strains. The average increase in the individual plant selected strains amounted to 38-3 per cent over the returns of the previous season; allowing for a general crop increase of 45 per cent owing to climatic conditions, this still leaves a margin of approximately 43 per cent that can only be accounted for as the result of plant selection. In a few isolated instances the increase was noticeably greater but in these cases was due to one of several causes during the previous season, either seed of poor germinating quality, or insect infestation or accident.

The table given illustrates in a general manner the results obtained.

RECORD of Individual Plant Selections with Garden Peas.

Name o	of Variety.	Record No.	Crop of Dry Seed 1913.	Individual Plant selected for growing 1914.	Crop of Dry Seed 1914.	Indi- selecte			
·			Oz.		`Oz.				
English W	onder	22 311	19.7	1 plant of 37 pods	69	1 plant	of 28	node	
U U	" "	22 312	19.7	1 " 37 "	69	1 praire	38	pous.	
11	17	22.321	20.2	2 n 20 n each.		i ii	34	11	
11.0	11	22.331	18.0	1 " 21 "	74	1 "	35.	, 11	
**	11	22.341	19.1	1 26 -11	80	1 "	36	1.0	
	8	22.351	19.1	2 " 20 and 19			00	14	
		22.001	10.2	pods each	78	1 "	43	11	
99	19	22.354	19.1	2 plants of 20 and 19					
				pods each	78	1 "	34	- 11	
17	17	22.361	6.6	1 plant of 25 pods		1 . "	42	11	
American	Wonder	22.371		2 plants of 18 and 16		~ " "			
				pods	70	1 "	51	111	
ii .		22.374	18.4	2 plants of 18 and 16					
				pods	70	1 11	41	11	
11	11	22.381	18.4	2 plants of 13 pods each	59	1 "	29		~
McLean A	dvancer	23,411		1 plant of 41 pods	88	2 plants	of 3	35 and	30
11	11	22.42!		2 plants of 40 and 27		nods.			
				pods	75	1 plant	of 64	pods.	
II.	11	22 423	22.0	2 plants of 40 and 27				_	
				pods	75	1 "	50	11	
11		22.431	17.5	1 plant of 24 pods	59	1 . "	31	11	

RECORD of Yield of Garden Pea Strains.

Name of Variety.	Record No.	Amount Sown:	Yield 1913.	Yield 1914.	Relative Gain or Loss.
		Seeds.	Oz.	Oz.	Per cent.
*Gregory Surprise * "Gradus * "" *American Wonder McLean Advancer English Wonder " " " * Little Marvel Stratagem Saxonian Laxtonian Duke of Albany	22 470 22 471 22 472 22 473 22 474 22 475 22 476 22 477 22 478 22 479 22 481 22 482 22 483 22 484 22 485 22 486	500 500 500 500 500 500 500 500 500 500	45 (dry) 38 " 46.5 " 57 " 93.5 " 87.5 " 88 " 98 110 95 14.5 85 67 81	91 (dry). 109 " 92 " 90 " 121 126 124 124 142 148 138 138 120 128 97 164 166	120 187 178 93 112 34 42 44 45 34 45 828 50 44

^{*1913} Germination poor, the relative gain is therefore too high, the average gain being 42.2 per cent.

POTATOES.

Selection with potatoes has been carried on to a limited extent owing to the lack of ground available for this particular crop. The work has consisted in selecting and isolating strains of the Early Ohio. The result of this work to date has not been encouraging owing to the fact that the district of Ottawa is not suitable for the production of potato seed. Further potato work will be undertaken in districts more suited climatically to the work in hand.

FLORICULTURE.

FLOWERS.

A certain amount of attention has been given to several varieties of flowers, namely Aquilegia, Geraniums, Sweet Peas, and several species of Solanum.

Attempts were made to cross several more or less hardy species of Solanum with Lycopersicum (the commercial tomato). Only in one instance was seed secured and that in the cross Solanum texanum x Lycopersicum Bonny Best. The seed of this cross is now being grown, and the seedlings bear a strong resemblance to the female parent Solanum texanum.

Many beautiful shades of Aquilegia were obtained among the new seedlings, and the only great drawback to this most valuable perennial is its tendency to become biennial. These seedlings will be further cultivated for several seasons with the object of securing from amongst them new strains of a decidedly perennial habit.

At this juncture it might not be out of place to draw attention to the qualities of the Aquilegia as a desirable Canadian national flower. It possesses the essential characteristics of hardiness, vitality, high fecundity, and is aboriginal in origin. Besides these essential characteristics the Aquilegia can be easily grown and will repay for the most meager attention a wealth of flowers in spring and early summer sufficient to change the aspect of many a deserted spot to one of real beauty. The Aquilegia possesses, moreover, flowers ranging in colour from the deepest maroon red through shades of pink, yellow and blue, to deep violet, orange and gold. Few flowers possess so many desirable and artistic characteristics as the Aquilegia, our common Canadian species so often found in woods has flowers exhibiting a beautiful combination of red and gold.

Some years ago several crosses were made with sweet peas with the object of ascertaining if possible the relative influence or predominance of colour of the parents in the offspring of succeeding generations. Owing to circumstances it was impossible to grow a sufficiently large number of the seedlings to throw much light upon this question, but from the progeny several worthy types have been secured and further selection work is being carried on.

The cross Countess Spencer and White Spencer in the F₁ generation gave only pinks resembling Countess Spencer, the F₂ yielded 4 whites, 2 creams, 3 cream pinks,

12 light pinks, and 2 salmon pinks.

The cross White Spencer (white) x Black Knight (deep maroon) yielded in the Γ_1 generation a type of flower resembling a somewhat faded Black Knight, showing nevertheless in the petals a tendency to segregate the colours purplish blue and purplish red. The F2 generation yielded 4 whites, 4 light lavenders, 1 light pink, 2 maroon and blue, 6 deep maroon. Two of the light lavenders possessed a peculiarly compact habit of growth, to which characteristic they bred true. Nothing was obtained from this cross equal in either form or colour to the parents.

The cross Phyllis Unwin (red) x Lady Grisel Hamilton (lavender) yielded in the F₁ generation a purple and lavender blue picotee distinctly smaller than either parent. The F₂ yielded 1 pure white, 1 cream, 3 pink tinted whites, 6 light blues or lavenders, 2 marbled lavender and purple, 2 purple pinks. In the succeeding generation, namely that of F₃, the majority of the lavender blues and purples showed a tendency in the petals to "marbling" or segregation of these two colours.

A number of crosses have recently been made between several of the excellent new single types of geraniums with the hope of adding to the types now in existence of these deservedly popular forms and colours.

METHODS ADOPTED IN HORTICULTURAL PLANT BREEDING.

In the production of new varieties the most necessary requisite factors may be said to consist of a certain amount of skill, larger amounts of care and patience, and an unlimited supply of hope and confidence combined.

In the average, the production of each new variety of real value necessitates the

testing under similar conditions of hundreds of worthless individuals.

New varieties are very largely produced from seed, and the seed is the product resulting from a union of the male organs of a flower with the female organs. The process is analogous though not physically similar to that of animals. The majority of our commoner and most generally known flowers possess in each individual flower, both male and female organs, the female portion being known as the "pistil" and the male portion as the "anther." The pistil is connected directly with the undeveloped seed or fruit at the base of the flower, the anther or anthers, as there are usually several of them, surround the pistil, and these anthers produce the yellow powdery substance known as pollen. The pollen consists of the spores or male seed distributed from the male organs or anthers. This pollen reaches the sticky end of the pistil and there nourished by the juice secreted by the pistil it germinates and sends down a very minute tube through one of the numerous channels within the pistil to the undeveloped seed cell or ovule at the base of the flower, and by this means the contents of the pollen grain is enabled to reach and combine with the contents of the undeveloped seed or ovule.

It will thus be seen that to produce a cross, one has "only" to prevent the pollen from all sources reaching the flower in question, except the pollen of the flower that has been selected as the male parent of the new cross.

The process of crossing two flowers is quite simple, but there are a number of precautionary measures necessary, so that one may be reasonably certain that the resulting fruit is actually the product of the cross made with the flowers selected, and not the result of fertilization by some other unexpected means.

The principal factors or influences to be reckoned with in this kind of work may be classified under two headings; namely those against which preventive measures must be taken to ensure accuracy of work, and those which tend to assist the natural process of fertilization. This classification has been made merely for the purpose of more easily describing the relative factors bearing on this work. Under the heading of "preventive influences" one can discern the action of certain factors thus classified that might equally readily be included under the heading "Assistive Influences." Under the heading of "Preventive Influences" there may be cited the following:—

(1) Self Fertilization or the liability of many flowers to fertilize themselves with their own pollen, such as Sweet Peas and Legumes generally. Self-fertilization sometimes occurs before the flowers have opened their petals.

(2) Cross Fertilization by means of pollen from other flowers carried through the agency of the wind. This is most commonly the case with so called anemophilous flowers such as Maize, Grasses, many Nettles, Meadow Rue, etc.

(3) Cross Fertilization by means of pollen from other flowers carried by insects. The great majority of our coloured and scented flowers are thus fertilized and are termed entomorphilous flowers.

(4) Cross Fertilization by means of pollen from other flowers carried through the agency of water. Flowers that are strictly hydrophilous or dependent on water to carry their pollen are not numerous and comprise several species of water lilies, anthuriums and caladiums, but water is often the accidental agency in carrying pollen for some of our entomophilous and anemophilous flowers.

(5) The Cross Fertilization of flowers by means of birds. These "ornithophileus" flowers are usually very vividly coloured, and grow in Tropic or Sub-tropic regions. In

the old world the so called sun-birds of the family of cinnyridae, and in the new world the humming bird family are chiefly instrumental in crossing these ornithophilous flowers.

There are also a number of minor agencies that should be guarded against when they appear. Attacks from pollen eating insects as thrips, sometimes occur. Consanguinity is often noted as a cause of partial or even complete sterility, and the consequent failure to obtain seed. By the terms consanguinity is meant, close or rather very close relationship, resulting from selection and inbreeding carried to excess.

Now to deal with the factors or influences that tend to assist the work of fertilization. I mention first, Botanical Relationship in contrast to the factor of consanguinity just dealt with. Varieties of the same species generally intercross quite readily, and are often greatly benefited by the infusion of "new blood" obtained in the nature of pollen from another variety. Different species of the same genus will often cross but there are nevertheless numerous exceptions. Plants of different general rarely cross, thus it will be seen that botanical relationship, or structural similarity at one end and consanguinity at the other, control the limits of our creative ability or imagination. Secondly one must arrange to cross varieties that blossom at the same season of the year. This limitation may be overcome by several expedients, namely, by forcing plants prematurely into bloom; by arranging dates of sowing the seed so that flowers will be produced simultaneously, or by saving and thoroughly drying pollen, which may be kept for a limited time to fertilize flowers of a later blossoming variety with one of an earlier season. The best results are obtained where the pollen can be taken from a fully matured flower of the selected male parent, and placed immediately upon the pistil of a fully developed flower of the selected female parent. The pollen of certain plants, corn for example, cannot be dried and stored as it loses its vitality very rapidly, usually a period of less than three days being sufficient to totally destroy it, whereas the pollen of certain pomaceous fruits can be successfully stored for several months.

Successful hybridization can only be carried on under favourable climatic conditions. The organic or sex portions of flowers are more easily damaged by extremes of cold or heat than are the asexual portions such as the petals or sepals: A warm somewhat moist atmosphere is the most suitable for the fertilization of blossoms and the consequent setting of fruit.

One must consider the relative physical proportions of the two plants which it is desired to cross. The pollen from varieties possessing small flowers will often successfully fertilize the pistil of a much larger flower, the disproportion in size in this case being chiefly in the comparative proportions of the floral envelope (petals and sepals) of the one flower with that of the other: the comparative proportions of the sexual organs of each parent being much more nearly allied to each other. Sometimes, however, instances are met with where the flowers structurally are very similar, where their "botanical relationship" is that of sub-species, and where everything would suggest that a cross might reasonably be secured yet, despite hundreds of attempts, no success has been obtained. It was later found out that the flowers of the plant chosen for the male parent possessed only short pistils whereas those of the female plant possessed long pistils. The pollen of the former species was able to fertilize the ovules or undeveloped seed sacs of its own species, but would not reach the ovules of the species chosen as the female parent. To overcome this physical disproportion the same species may be used but the sexuality of each changed, so that pollen secured from the species possessing the long pistil may be placed upon the short pistiled flowers of the other plant; by this transposition fertilization may be more readily secured.

It may be now asked how it is possible to guard against the contingencies of the first class and avail oneself of the advantages of those of the second.

In the first place, namely to prevent self-pollination, the flowers are chosen while yet in bud and just prior to opening, and are emasculated by carefully opening them and removing all the anthers by means of a fine pair of forceps or seissors. The flowers thus emasculated are placed in paper bags so that when they open they will not be visited by insects that have been roaming amongst other flowers and are covered with a variety of foreign pollen.

The paper bags must be large enough to prevent any possibility of the flowers being crushed, but if too big the bags will be severely battered by wind and rain. A good rule is to use the smallest bag that will just cover the blossoms without crushing and yet large enough to be securely tied to the twig. In tying bags around the flowers the bags should be carefully drawn together and then firmly but not tightly tied, for if the pressure of the string is too great, the blossoms within the bag will fall and the work spent on them be lost. When a sufficient number of flowers have been emasculated and bagged they may then be left for a few days to reach maturity. In the meantime it will be necessary to cover with bags a number of flowers on the tree or plant that has been chosen as the male parent. These flowers on the male parent must not be emasculated as it is the development of the male organs or anthers that will supply the pollen for crossing on to the flowers that have been emasculated on the female flower.

The flowers that have been emasculated and bagged will usually mature a day or two days earlier than the remaining flowers on the same tree that have been allowed to develop normally; therefore before the tree is in full bloom it is advisable to open several of the bags and ascertain whether the emasculated flowers are fully matured and ready for crossing. The blossoms when ready for crossing are wide open, and with the aid of a small magnifying glass one can often discern a sticky secretion on the stigma or receptive head of the pistil. The stigmas of different flowers vary much in shape; in the Plum and Cherry and in numerous herbs such as Primula, Petunia, Salpiglossis, and Nicotiana, the pistil resembles a pin and the stigma the pin's head. In the apple and pear and other allied plants, the pistil divides radially into five curved and hairy threads. The stem or style of the pistil is united for more than half its length when it then divides into the five (sometimes four or even six) threads just mentioned.

In many cases what is commonly regarded as a single flower is really an aggregation of several, or many; and these compound flowers as they are called, are to be met with amongst some of our commonest and most generally known flowers and weeds. In this case the many little flowers growing on a common base or receptacle must be studied individually and in crossing varieties that possess such compound flowers the work must entail isolation and emasculation of each individual flower in this aggregate mass. This work is often quite difficult to successfully accomplish, and a beginner who is desirous of keeping an accurate record of the work is not recommended to begin on these compound composite flowers. Some well known examples of these compound flowers are: Dandelions (Tararacam officialle), Groundsel (Senecio vulgaris), Sunflowers (Helianthus annuus), and Daisy (Bellis perennis).

When the blossoms are ready for crossing collect the flowers that have been selected and covered for pollen bearers. With a fine pair of tweezers or needles remove the yellow anthers. This operation should be done so that the anthers may drop on to a sheet of smooth glazed paper from which they are easily collected.

When the anthers have been collected from a score or more of blossoms, they should be placed in a dry warm room (that is if circumstances or climatic conditions do not permit of their immediate use), and here allowed to dry thoroughly. When the anthers have thoroughly dried up they will have shed all the pollen they contained. This may now be placed in a clean, dry glass bottle or vial and securely corked. In the case of apple, pear, and plum pollen, if kept in a dry, dark place and only brought

to the light for occasional use or observation, this pollen may be kept for a number of weeks and still retain its vitality.

Pear polien was secured in this manner by cutting small branches from a dormant orchard during the latter part of February. These twigs were gradually forced into bloom and the pollen produced was saved and thoroughly dried. This pollen was used upon pear blossoms that had developed naturally in the orchard, and were emasculated while yet in the bud stage. The crosses with this stored pollen and the results obtained were as follows:—

Pate.,	Female Parent or Tree.	Pollen Parent.	Age of Pollen.	Fruits.	Seeds.
May 8 May 9 May 9 May 8 May 8	Kurskaya Lemon Pear Zuckerbirn Clairgeau	Zuckerbirn Zuckerbirn Lemon Pear Kurskaya Kurskaya Kurskaya Kurskaya	April 9 March 4 March 5 April 9 May 7	21 0 12	None. None. (Six, semi-developed) None. (Ten, semi-developed) Plump seeds. Forty-two (32 plump)

In the above record it will be noticed that the pollen used in three instances was nine weeks old, and this pollen was secured from twigs that had been cut from dormant trees just a month earlier. This pollen produced in three trials, twenty-nine fruits containing altogether six semi-developed seeds. (With regard to the relatively poor development of seed it may be stated that the Russian varieties of pear used in this experiment are under normal orchard conditions noticeably deficient in the development of seed in normal average-sized fruits.)

The pollen secured on April 9, or a little over four weeks old, produced in two trials nineteen fruits containing altogether ten semi-developed seeds. The pear pollen secured on May 7, and used two days later, produced in two trials twenty-seven fruits containing forty-two plump seeds and ten semi-developed. This tends to show that although pear pollen is able to retain a certain amount of vitality for several weeks, it is as might be expected more potent in a fresh state.

Mr. Cecil II. Hooper, M.R.A.C., who has worked quite extensively upon the question of the vitality of pollen, says in the Royal Horticultural Society's Journal of November, 1912 (page 247): "Apple pollen was found to germinate after six months when kept in a dry place at a temperature of between 50° and 65° Fahr. The length of time that plum pollen retained vitality was less, but generally it would seem that pollen can be safely transported and kept for some time without any very noticeable effect upon its germination." Mr. Hooper further adds, "that under favourable conditions it was found to take from nine to thirty-two hours for the pollen tube of apples, plums, and cherries to reach the ovary when placed on the stigma or in germinating medium. Cherry pollen required a little over twelve hours."

The equipment that is necessary to carry on this work is both simple and inexpensive. All that is needed is a narrow bladed, sharp pointed pair of scissors, a pair of small forceps, two needle holders fitted with moderately stout needles, a scalpel, and a small camel's hair brush. With these few simple instruments it is possible to conveniently work with a great variety of our flowers and vegetables. A very convenient method of securing the necessary instruments for this work is by buying a set of dissecting instruments in small folding case at a moderate price, as arranged by many of the instrument manufacturers for elementary dissecting work in school and college laboratories. These sets vary in price from \$1.50 to \$8, but a set costing \$2 to \$3 will be found to contain all the above-mentioned instruments.

Thin manilla paper bags are required for covering the flowers that have been emasculated and cro-sed; the most convenient sizes are perhaps the one-pound and the half-pound bags. Small tags for recording the nature of the cross that has been made and also for the purpose of marking the actual cluster of flowers that were worked upon are required.

Thin manilla paper bags are required for covering the flowers that have been emasor stiff paper, with a short piece of fine cord or string attached to each, will be found to be the most satisfactory. When a flower or several flowers have been crossed with pollen from another variety the cross that has been made should immediately be recorded on a tag and the tag fastened to the flower spike. The rapid growth of plants at this season of the year makes it necessary to attach a label quite distinctly to each flower spike crossed, because in the course of a few weeks one is generally unable to identify the particular flower cluster that was crossed from among the number that have since been produced.

In recording a cross it is generally the custom to write the name of the female parent (or plant upon which the cross was made) first, and the male parent second. Thus if the variety of tomato known as Earliana has been used as the female parent and has been crossed with pollen from the variety known as Chalk Jewel, the cross would be written Earliana x Chalk Jewel. The sign after Earliana (a circle with a pendent cross) denotes the female sex, and the sign following Chalk Jewel (a circle with a arrow erect) denotes the male sex. On the other side of the label or in the notebook in which a record is kept of the crosses that have been made, it is also advisable to record the date and climatic conditions. Such as (10/5/14) hot, which would denote that the cross was made on the 10th day of May (the fifth month), 1914, and the day was hot.

EXPERIMENTAL STATION FOR PRINCE EDWARD ISLAND.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

Good progress was made with the horticultural work at the Station in 1914. A part of the property that had been under lease to Mr. G. Albert Mutch became available and was used for garden purposes. A wide border of perennial flowers along the Mount Edward road added greatly to the appearance of the Station grounds. The flowers were quite an improvement over former years, and the second annual flower show held by the Floral Association of Prince Edward Island in August gave every evidence that the interest in beautifying the homes of the province is increasing rapidly. The vegetables and fruits gave satisfactory returns. Insect and fungous pests were apparently more numerous and caused greater damage than usual.

SEASONAL NOTES.

Heavy snow that lay on the ground the greater part of the winter of 1913-14 gave protection to many of the shrubs and plants during the extremely cold weather of February. The spring of 1914 was very backward. Many shade and fruit trees were broken by an ice storm on April 21. There was sleighing on May 2, and a light fall of snow as late as May 11. This was followed by favourable weather, and the trees appeared green on May 28. The cold nights and frequent showers of rain during June delayed all vegetation. Frost was reported in sections of the province on the night of July 1. The strawberry and currant bloom was injured by frost and the fruit was late in ripening. July was cool and dull, so that the abundant rainfall of June was available for the plants during the splendid growing month of August. The first and third weeks of September gave the hottest weather of the summer and ripened up the fruit and vegetables quickly. October and November were very fine. Scarcely enough rain fell for fall ploughing.

Ploughing continued up to December 5, and winter began on December 22, and we had not only snow but extremely low temperatures for Christmas. The winter of 1914-15 was mild with but two exceptions, the one already mentioned and another cold spell about February 1. Quite a little snow lay on the ground late in March, which was a great benefit to many plants, as scarcely any spring heaving has been

cbserved.

METEOROLOGICAL RECORDS.

The mean monthly temperatures, rainfall and hours of sunshine recorded at the Charlottetown Station for the year ending March 31, 1915, were as follows:—

	Mean average Temperature.	Rainfall.	Sunshine.
	•	Inches.	Hours.
pril. day. une uly uly ugust eptember cotober fovember ecember anuary elbruary larch	32 66 48 548 51 741 63 201 64 000 59 016 47 823 35 284 22 709 21 55 22 624 25 77 4	3 · 78 2 · 05 5 · 32 2 · 84 2 · 43 5 · 02 3 · 57 2 · 65 2 · 02 5 · 32 2 · 34 2 · 35	194:9 191:4 247:7 277:9 247:9 191:0 135:9 96:5 99:9 72:4 91:6 86:4
Total annual		39.69	1,936.5

AREA DEVOTED TO HORTICULTURE.

Two acres were added to the horticultural area during the year, making a total, with wood lots and avenues, of 24 acres.

The wood lots and borders of trees were given a thorough cleaning up and are now very attractive to visitors and the Farmers' Institute Excursions that come to the Station during the hot weather. The beautiful white birch trees which are everywhere, were greatly admired throughout the year.

LARGE FRUITS.

ADDIES

One apple was borne in the apple orchard set in 1910. The trees were sprayed regularly with a power sprayer and made very satisfactory growth. A few dead trees were replaced. In the old orchard the fruit was clean and free from codling moth. Only a medium crop was harvested.

CHERRIES.

The cherry trees were again loaded with bloom and there was a fair set of fruit. The birds proved very destructive to this fruit.

PLUMS.

The spraying kept the plum trees free from disease. Not a single black knot has been found so far in the orchard since it was set in 1910. The following varieties bore fruit:—

Name.	Amount.	Date ripe.	Uniformity.
Grand Duke Reine Claude Saunders Smith Orleans McLaughlin Dow Purple Ecg Monarch		Oct. 13 13 Sept. 24 Oct. 10 Sept. 24 Oct. 13 7 17 7	Medium. Uniform. " Medium. Uniform.

PEARS.

The pear trees set in 1910 are clean and healthy and made very strong growth. The following trees have borne fruit:—

Name.	Amount.	Date ripe.	Size.
Lucrative. Duchess. Founds Beauty Lawrence	Gal.		Large. Not uniform. Large. Medium.

SMALL FRUITS.

CDAPES

The very late spring kept the grapes quite late in starting growth. The amount of fruit was not so large as in the previous year; however, a fair crop ripened on Winchell and Moyer. Peabody, Delaware and Golden Drop were ripened by tying paper bags over the clusters. The other varieties tested that did not ripen were: Brant, Brighton, Canada, Daisy, Lindley, Manito, Moore Diamond, Moore Early, Worden and Wilder.

CURRANTS.

The crop of currants was much lighter than the previous year, due apparently to the bushes being heaved out of the ground somewhat by the frost. The currant worm was quite numerous on the red and white varieties. These were killed with hellebore. The following varieties did best:—

(Black) Ontario, Saunders and Kentish Hero.

(Red) Moore Seedling, Knight, Large Red and Early Scarlet.

(White) White Grape, Kaiser, and Large White.

CHARLOTTETOWN.

GOOSEBERRIES.

Keepsake, Crown Bob, and Industry gave the best returns among the gooseberries, which were a light crop in 1914.

RASPBERRIES.

Shaffer (Purple) gave the highest yield. Loudon and Herbert (Red) gave very satisfactory yields. Cuthbert winter killed badly the previous winter but made a strong growth of young shoots. Golden Queen (White) gave a comparatively small yield, but produced fruit for a very long period.

STRAWBERRIES.

Twelve seedling varieties were received from Ottawa and planted in May. A new plantation of the different varieties that have been under test at this Station was set out in May. Late frosts destroyed quite a little bloom, and the yields for 1914 were not high. Twenty-seven varieties were tested. The first fruit was ripe on July 10, and pickings continued until the 13th of August. The following varieties are named in order of yield: Bisel, Haverland, Bederwood, Warfield, Bubach. A number of varieties were grown in matted rows. These gave larger returns per acre than those in single rows. Bederwood led the list of varieties in double rows. Others in order of yield were: Parker Earle, Fountain, President, Splendid, Parson Beauty.

TREES AND SHRUBS.

The splendid collection of trees and shrubs on the lawns and along the driveways about the Station grew well and produced much bloom throughout the season. The area about the lily pond was levelled, seeded down, and a few trees planted. A hedge of Spiraea was planted along the cross-road to St. Avards, and the front lawn was divided from the orchard by a hedge of Berberis Thunbergii. The following trial hedges were added to the group already at the Station: Rhamus cathortica, Hamamelis virginica, and Rosa rubrifolia.

VEGETABLES.

One hundred and ninety-three plots of vegetables were tested in 1914. A new piece of ground that had been in potatoes and strawberries for several years was used for many of these. This land was afterwards found to be thoroughly infested with Club-root, which caused much injury to cabbage, cauliflower and turnips.

The Carrot Rust Fly again attacked the carrot crop. The use of tobacco water applied to the young plants held the pest well in check.

ASPARAGUS.

The bed of asparagus did not winter well, asparagus rust was present and the crop did not come up to expectations.

REETS.

Seven varieties of beets were sown May 16, in rows thirty feet long and thirty inches apart. The beets were thinned to four inches apart. The following is the record of the different varieties:—

Name.	Fit for use.	Shape.	Quality.	Yield per acre.
Cardinal Globe Early Blood Red Turnip. New Meteor. Eclipse. Erystian Dark Red. Ruby Dulcet New Early Black Red Ball.	n 5 n 1 n 1 n 1	Turnip Pointed Turnip Round Ball	H H H	1- 400 84

BEANS.

The beans matured well during the late dry autumn. There was much less anthracouse than in former years. The following varieties are named in the order of merit:—Golden Wax, Valentine Wax, Refugee, Rustless Wax.

CABBAGE.

Owing to the serious injury to the cabbage caused by Club-root, the data regarding cabbage for 1914 is of little value. We can say that Fottler Improved Brunswick withstood the disease better than any other late cabbage, while Flat Swedish seemed to have the strongest resistance among the early cabbages.

CAULIFLOWER.

The cauliflower although attacked by Club-root produced many fine heads. The Danish Giant Dryweather was the best recorded.

CUCUMBERS.

Five varieties were planted on May 29 in hills 6 feet by 6 feet each way, three hills to each variety. The data are given in the following table:—

Name.	Fit for use.	Yield per acre.
Extra Early Russian. Cool and Crisp. Peerless or Improved White Spine. Prize Pickling Giant Pera.	August 29 29 28 October 2 26	Tons Lb. 4 323 3 940 3 236 2 626 2 325

CORN.

Thirteen varieties of corn were planted on May 29 in loose sandy loam soil in hills 3 feet apart each way. There were twelve hills of each variety. The corn was pulled when ready for the table. The following gives the details of the experiment:—

Name.	Date of planting.	Date ready for use.	Yield of plot.
Pocahontas Eurly Fordhook Perkins Extra Early Market Metropolitan Early Dawn Golden Bantam Early Iowa Black Mexican Extra Early Adans Early Adans Early Adans Early Evergreen	29 11 29 12 29 11 29 12 29 12 29 12 29 12 29 12 29 12 29 12 29	" 19" 18" 10" 10" 26" 10" 26" 10" 26" September 19" 19	85
Stowell Evergreen. Country Gentlen.an	n 29	Did not mature.	

EGG PLANT.

The egg plant did not mature.

CITRON.

Only two citrons grew large enough for use.

LETTUCE.

All varieties of lettuce did well. They were planted in the open on May 1, and were ready for use on July 14. The following varieties are named in order of merit: Iceberg, Dreer All-heart, Grand Rapids, and Dark Green Capucine.

MUSKMELON.

The muskmelons did not mature.

PUMPKIN.

Two varieties of pumpkin were transplanted on June 16. Earliest variety, gave a large yield of pumpkins of good quality. Connecticut Field produced a fair number of medium-sized pumpkins.

ONIONS.

Considerable injury was done to the onions by the Onion Maggot which thinned the plants out greatly during the summer. The three best varieties in order were: Large Red Wethersfield, Red Globe and White Globe.

PARSLEY

The Double Curled parsley gave very good satisfaction. Part of this was lifted from the field with the clay on the roots and placed in the cellar where it kept until spring.

PARSNIP.

The Intermediate and the Improved Hollow Crown both gave good yields.

CHARLOTTETOWN.

PEPPER.

The peppers were just left in the hot-bed and when cold weather came in the autumn they were protected again with glass. In this way we secured very fine peppers from the three best varieties which in order of yield were: New Neapolitan, Red Chili and Long Red Cayenne.

PEAS.

Fifteen varieties of peas were planted on May 12 in rows thirty feet long and three feet apart, seed planted one inch apart in the rows.

One half of each was picked for green peas and the other half allowed to ripen for seed. The following is the record kept of the results:—

Name:	Ready for use.	Amount picked green.	Amount ripe clean shelled peas.
`		Lb.	Lb.
1 clephone	July 29	123	51
Thomas Laxton	20	20	21/2
	Aug . 7	8 .	$\begin{array}{c}2^{\frac{7}{2}}\\4^{\frac{1}{4}}\\2\end{array}$
Gradus		$7\frac{1}{2}$	2
Dainty Duchess	Aug. 4	7	5
	July 23	$6\frac{1}{2}$	$\frac{2\frac{1}{2}}{2}$
	Aug. 4	6 .	14
Early Giant	July 20	6	1.5
Quite Content.		4	25
Gregory Surprise.		<i>0</i> 4	3
Stratagem. Sutton Excelsior.	Aug. I	0 -	Destroyed by insects.
The Lincoln.		J	Destroyed by insects.
American Wonder		Destroyed by insects	Destroyed by insects
Premium Gem			is contagod by maccis.

RADISHES.

The two varieties of radishes were first sown on May 18, and then from time to time throughout the season. The Turnip Early Scarlet White Tip was considered superior to the Forcing Turnip Scarlet.

SQUASII.

Ten varieties of squash were planted on May 4. Three hills of each variety were planted 9 feet apart each way. The vines grew very strong and though the yields were not so great as the previous year yet most of the varieties gave good returns. The following are the records that were kept:—

Name,	Fit for use.	Size.	Date of harvesting.	Yield per plot.
Long Vegetable Marrow. Mammoth Whale. Hubbard. Golden Hubbard. Delicious. Crookneck. Custard Marrow, scalloped. Long White Bush Marrow. White Congo	Aug. 27 " 27 " 30 " 27 " 27 " 20 Did not	Medium Small Medium Large nature.	" 9 " 9 " 9 " 9	Lb. 206½ 187 143½ 120 99 57½ 35 27½

In order of merit, regarding quality, we placed the squash, Hubbard, Golden · Hubbard and Delicious.

CHARLOTTETOWN.

TURNIPS.

Owing to Club-root the records of the three varieties of turnips are not reliable.

TOMATOES.

Eight varieties of tomatoes were grown on land that proved to be late and it was so located that there was not sufficient sun reached the vines to ripen much of the fruit. Five plants of each variety were planted four feet apart each way, and the following records were obtained:—

. Name		,	Date sown.	Date ripe.	Yield of plot.
Extremely Early I. X. L. Prosperity Fiorida Special Sumphrook Strain Earliana Chalk Early Jewel Rennic XXX, Earliest Round Scar Line Bred Northern Adirondack, G Johnson Jack Rose	let Skin. rade No. 1		0 24	Oct. 8 8 8	Lb. 55\\\\ 25\\\\\\ 23\\\\\\\\\\\\\\\\\\\\

POTATOES.

No blight was observed. The yield per acre was computed from the weight of one row 66 feet long. Rows were 30 inches apart and plants 14 inches apart in the rows. All seed potatoes were soaked in a formalin solution before planting.

Test of Varieties. Planted May 21, dug October 3, 1914. Plots, 1/264 of an acre.

No.	Name.	Form and Colour.	Yield acre so		Marke	table.	Unma able	
		Long White	Bush.	36	Bush.	Lb. 24	Bush.	Lb.
3 4	Table Talk Late Puritan Wee McGregor McIntyre	Long "	598 576 541 528	24 24 12 00	510 521 426 475	24 24 48 12	88 55 114 52	00 00 24
6	Dreer Standard	Long White Oval White	519 510 501	12 24 36	448 446 343	48 28 12	70 83 158	48 24 36 24
10	Empire State	Round Red	479 468 453	36 36 12	374 371 308	00 - 48 00	105 96 145	36 48 12
13 14	Garman No. 1. Garmet Chili Green Mountain. (1 row). American Wonder	Round White	440 433 431 422	00 24 12 24	290 376 325 316	64 12 36 48	149 57 105 105	36 36 36
16 17 18	Gold Coin Burbank Seedling California Red	Round 11 Long 11 Oval Red	420 409 398	12 12 12	321 325 327	12 36 48	99 83 70	00 36 24
20 21	Irish Cobbler	Oval "	396 374 343	00 00 12	325 246 211	36 24 12	70 127 132	24 36 00
	Ashleaf Kidney. (1 row) Rawlings Kidney		334 316	24 48	233 264	12 00	101 52	12 48

In the spring of 1913 five varieties of potatoes were sent to Ottawa for identification purposes. They were grown there in 1913 and compared with varieties under the same name. Samples true to type were returned, and after treatment were planted at the end of the row of the same variety, the seed of which had been produced at the Charlottetown Station in 1913. The following table gives the results:—

Name.	Yield per acre Ottawa seed.	Yield per acre Ch'town. seed.
McIntyro Irish Cobbler Rochester Rose Late Puritan Gold Com	Bush. Lb. 308 00 37 00 17 36 16 30 6 36	Bush. Lb. 528 00 396 00 343 12 576 24 420 12

The plants from the seed grown at Ottawa started well, but after attaining the height of about eight inches they remained almost stationary. Rhizoctonia, known as Little Potato disease, was present. The striking feature shown in the table is the wonderful resistance of the McIntyre to the disease that affected the other varieties.

The results shown would indicate the value of planting home-grown seed that is free from disease.

FLOWERS.

ANNUALS.

The annual flowers added much to the attractiveness of the grounds about the Station. The bloom was a little late in the spring, but owing to the profuse supply of moisture during June and July they made a strong growth and gave an abundance of magnificent bloom during the summer and autumn. Only two serious pests occurred to injure the annual flowers. These were the aster blight and the root aphis on the sweet peas and asters. Investigational work was started to learn how to combat both of these. The following is a record of the details concerning some of these annuals:—

No. of Varieties.	Name.	Date planted under glass.	From	To	Remarks.
20 1 17 1 1 1 1 1 1 6 1 6 1 1 1 1 2 2 1 1 1 1 1	Aster Alyssum Antirrhinum Balsam Candytuft Carnation Costor Oil Dhrysanthemum Cockscomb Coreopsis Cosmea Godetia Marigold Nasturtium Nemesia Nicotiana Petunia Phox Drummondii Phortulaca Salvia Stocks Sweet Sultan Verbena	July 2 April 27 July 2 July 2 April 27 July 2 Paril 27 Paril 27 Paril 27 Paril 27 May 4 Paril 27 May 4 Paril 27 May 4 Paril 27 May 4 Paril 27 Paril	" 30 July 27 Aug. 20 " 30 Sept. 16 Aug. 16 July 12 " 24 " 7 " 13 Aug. 16 " 9 July 19 Aug. 20 July 23 " 26 " 15 " 14 Aug. 4 July 22 Aug. 4	16 Nov. 5 Oct. 15 16 Nov. 2 Oct. 24 10 Nov. 2 Oct. 18 Nov. 11 1 2 Oct. 16 Nov. 6 Oct. 29 Nov. 4 1 10 Oct. 20 1 29 Nov. 16 Nov. 16 Nov. 16	Good. Excellent. Fair. Good. Fair. Good. " " Extra good. Good. Fair. Good. Very good. Good. Very good. Extra good. Good. Very good. Good. Extra good. Good. Fair. Good. Fair. Good. Fair. Good. Fair. Good. Fair. Good. Fair. Good. Fair. Good. Fair. Good. Fair. Good. Fair. Good. Fair. Good. Fair. Good. Fair. Good. Fair. Fair

CHARLOTTETOWN.

BULBS.

The cool dull weather produced extra large and perfect blooms on the bulbs, which remained in bloom for a longer period than usual. Very fine bulbs were produced and replanted. The narcissi seem to improve the longer they are grown here. A list of the varieties is here given, with some of the details regarding their growth.

The tulips were planted in various colour schemes in the flower beds in October and mulched in the fall. The mulch was removed early in the spring and the ground

stirred about the bulbs which came up as soon as the snow was off them.

The narcissi were placed in a border and made a beautiful showing all along the road from the residence to the public highway. The other bulbs bloomed in their season and gave the lawns a bright appearance all through the cold spring.

EARLY TULIPS.

			Bloomin	g Period.
Variety.	Height.	Colour.	From	То
Artus	17 19 18 17 15 17 18 19 16 18	White	May 21 May 23 May 24 May 22 May 22 May 23 May 23 May 23 May 23 May 23 May 23 May 23 May 23 May 23	June 7. June 8. June 18. June 8. June 8. June 8. June 8. June 11. June 7. June 20. June 11. June 11.

LATE TULIPS.

Variate	TY ' 1 /		Bloomin	Period.	
Variety.	Height.	Colour.	From	То	
Darwin Gesneriana Spathulata Isabella La Candeur La Merveille Picotee Yellow Rose	In. 24 16 17 17 22 22 13	Varied colours Scarlet Pink and white White Bronze salmon White pink edged. Golden yellow	June 9 June 9 June 7 June 5 June 8	July 2. June 28. June 27. July 3. June 26.	

OTHER BULBS.

	2		Bloomin	g Period.
` Variety.	Height.	Colour.	From	То
	In.			
Anemone— Anemone coronaria, double mixed. Anemone coronaria, single mixed. Anemone St. Brigid	12 to 15 12 to 15 12 to 15	Varied Varied Varied	June 2	July 31. July 31. July 31
hionodoxa.— Ckionodoxa Luciliae	6	Blue	April 21	May 8.
Procus. Crocus, general mixed	5	Mixed	April 24	1
Freesia refracta			Winter-	killed.
tris hispanica, mixed	16 16	Varied Varied	July 15 July 18 .	Aug. 2 Aug. 13
Alto pleno odorato. Incomparabilis plenus. Jonquilla plena. Orange Phoenix. Double van Sion. Burri Conspicuus. Cynosure.	16 16 16 16 16 16 14 15	White	May 25 May 25 May 22 May 23 May 25	June 12 June 12 June 10 June 10 June 6
Emperor Empress Figaro Golden Spur Pocticus, Ornatus.	10 10 12 11 12 12	Yellow Yellow and white. Pale yellow Deep yellow Pure white.	May 20 May 10 May 22 May 18 June 5 June 3	June 8 June 10 June 8 May 30 June 11 June 11
Princeps. Sir Watkin Victoria	11 15 10	Yellow Deep yellow Clear yellow	May 21	June 10

PERENNIALS.

The collection of perennials was very much appreciated by visitors to the Station. Many of the ladies attending the Farmers' Institute picnics took notes on such as would meet their requirements. These hardy flowers require much less attention during the busy seasons on the farm than annuals, and are becoming deservedly popular in rural communities.

As the hundreds of varieties of perennials that are being tested at the Station have become more firmly established the quantity of bloom has greatly increased. These perennials have been planted in large permanent borders along the avenues of the Station and along the Mount Edward road.

The Kentucky water lilies bloomed profusely, and are rapidly covering the pond to the west of the buildings with a mass of beautiful floating leaves and pink and white flowers.

CHEMICAL COMPOUNDS FOR KILLING WEEDS.

An experiment with chemicals was conducted to determine the best method of keeping roads and paths clean and free from weeds and grass.

The following table describes the solutions, application and results:-

No.	Treatment.	How Applied.	Date.	Effect.
1 2 3	Common salt, 1 pound to 1 gallon of water. Common salt, 2 pounds to 1 gallon water. White arsenic 1 pound, washing soda 2	Hot	July 4.	Unsatisfactory. Unsatisfactory.
4	pounds, water 6 gallons Bluestone 2 pounds, water 6 gallons	on hot Sprayed cold	June 29. June 29.	all weeds.
5 6 7	Sulphuric acid, 1 part to 1,000 parts water; Sulphuric acid, 1 part to 500 parts water Acid sulphate of soda, 1 pound to 1 gallon of water	Sprayed cold	June 29. July 4. June 29.	
9	Herbicide, 1 part to 20 parts water Herbicide	Sprayed cold		Killed weeds and most of the grass. Fairly good.

While many of these did fair work they were expensive if used in any but a small way. We found hand hocing the cheapest and most satisfactory method.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

The following comprises the annual report of the horticultural work done on the Experimental Farm at Nappan, N.S., for the year 1914-15.

SEASONAL NOTES.

From a horticultural standpoint the season of 1913-14 was unsatisfactory. The winter was very severe, the temperature falling on one occasion to -27 degrees Fahr., and temperatures in the neighbourhood of -20 degrees were frequently recorded. Some exceptionally severe snowstorms were experienced and the ground was well covered with snow the greater part of the winter. After it disappeared during the latter part of March, however, some heavy freezing and thawing occurred. As a result of this, winter-killing was fairly general, particularly with strawberries and apple trees.

The spring was cold and backward, the fine weather of the latter part of May being succeeded by a cold and wet June. On the 4th of this month a frost of 6 degrees was recorded. This did considerable damage. The summer months were also cooler than usual, the highest temperature recorded during the season being 84 degrees. This period was also marked by frequent rains.

The fall started in wet very early, this weather continuing until the approach of winter. As a consequence of this the soil at this Station, which is mostly of a clay formation, soon became unworkable.

The crops of both the large and small fruits were below the average. Vegetables also made unsatisfactory growth. The flowers, ornamental trees and shrubs, however, did particularly well and were a continual source of interest to visitors.

Some Weather Observations taken at Nappan Experimental Farm, 1914.

Month.	TE	MPERATURE	F.	PRECIPITATION.			Total	
Month.	Highest.	Lowest.	Mean.	Rainfall	Snowfall.	Total,	Sunshine	
1914.	0	٥	0	Inches.	Inches.	Inches.	Hours.	
January February March April May June July August September October November December	46 42 46 61 79 77 84 84 84 69 60	-19 -27 8 8 8 24 26 35 40 33 20 7 -17	13·5 07·5 30·17 33·94 49·03 54·19 61·54 62·84 56·25 27·02 33·59 20·22	1 30 0 30 1 73 1 89 0 75 4 23 3 61 2 95 3 05 2 46 2 97 1 46	17:00 23:00 4:00 18:00	3·00 2·60 2·13 3·69 0·75 4·23 3·61 2·95 5·05 2·46 2·97 1·46	92 40 138·50 107·85 147·10 243·30 255·00 210·80 161·75 139·35 85·75 110·15	
Total for year	nths. April	to Septem	ber	26.70 30.83 16.48 17.56	62:00 56:74 18:00 6:3	32·90 36·71 18·28 18·19	1864 · 20 2003 · 04 1190 · 20 1298 · 65	

LARGE FRUITS.

The crop of large fruit from the standpoint of quantity was rather a disappointing one this season. The quality of the fruit more than compensated for the shortage in quantity, however, particularly in apples. Notwithstanding the very favourable season for fungi development, such diseases were much less prevalent than in former years. This was undoubtedly due to a large extent to the thoroughness and frequency of the spraying operations.

Four sprayings of the following mixture were given during the season: Commercial lime-sulphur of the strength of 1 degree Baume and lead arsenate 2½ pounds in 40 gallons water. The first spraying was applied just after the buds opened, followed by another on the falling of the blossoms. The other two applications were made at intervals of two weeks. To the last application one ounce of Black Leaf 40 to every 40 gallons water was added to control the apple aphis, which was becoming trouble-some.

SPRAYING EXPERIMENTS.

An experiment was conducted to test out the value of Bordeaux and lead arsenate as an orchard spray when compared with commercial lime-sulphur and lead arsenate. For this purpose sixteen plots were laid off in the wood orchard, eight of which received tour applications of Bordeaux of the standard strength and eight, lime-sulphur; 2½ pounds of lead arsenate to every 40 gallous being added to both the Bordeaux and the lime-sulphur. When harvested, a representative sample was taken from each plot and the fruit sorted and graded. The following table gives the results:—

Comparison of Bordeaux and Lime-sulphur-Spraying Experiment.

		Lin	e Sclp	HUR.			В	ORDINA	ex.	
Variety.	Clean.	Wormy.	Scab.	Russeted.	Oyster Shell Scale,	Clean.	Wormy.	Seal	Russeted.	Ovster Shell Scale.
Beautiful Arcade Long Arcade. Grandmother Duchess Pointed Pipka. Antonovka. Winter Bough Pewankee. Average.	78·57 66·6 72·34 67·07 86·95 79·62 70·0 88·2	% 17:86 20:98 11:70 23:17 10:43 11:81 22:0 4:91	% 4 11 2 12 3 65 1 63 1 44	5.55 2.0 4.91	2.6	% 55.84 23.52 57.81 45.23 74.11 23.21 62.71 61.8	% 10·4 19:32 10·93 23·8 15·3 14·28 11·86 28·5	11.06	% 25.96 52.52 17.15 30.95 5.88 58.92 25.42 7.5 28.04	% 7.78 2.94 3.53 3.55 2.22

While this represents the result of one year's work only, nevertheless the figures are fairly conclusive. In nearly every case the Bordeaux sprayed fruit showed a much higher percentage of russeting than that treated with lime-sulphur. This experiment will be continued another year.

Another experiment was conducted at this Station to compare lime-sulphur and Black Leaf 40 with lime-sulphur and arsenate of lead. Standard strengths were used in all cases and the same procedure followed as in the previous experiment. The following were the results obtained:—

6 GEORGE V, A. 1916

Spraying Experiment—Lime-sulphur and Black Leaf 40 versus Lime-sulphur and Lead Arsenate.

Variety.	Lime-sui	PHUR AN	D BLACK	LEAF 40.	Lime-sui	LPHUR ANI	LEAD A	RSENATE
varieby.	Clean.	Wormy.	Scab.	Other Defects.	Clean.	Wormy.	Scab.	Other Defects.
	%	%	%	%	%	%	%	%
Alexander	70·96 58·0	12·09 6·0	36.0	16.85	33·33 70·0	26.66 4.0	16.66 26.0	23.33
Average	64.48	9.04	18.0	8 · 42	51.66	15.33	21.33	11.66

In accepting the above figures, it must be borne in mind that the work represents one year's results and then only on a small scale. One cannot form any definite conclusions, therefore, until the work has been continued over a number of years and on a larger scale.

A test was also made of Bordeaux mixture and Black Leaf 40 in combination. Four applications were given and no injurious effects could be noted.

COMMERCIAL ORCHARD.

As in previous years, a complete record was kept of all the expenditures and revenue in connection with the commercial orchard, the purpose of this being to find the actual cost of bringing an orchard into profitable bearing. The vegetable garden, vegetable test plots and potato test plots were located as intercrops in the orchard and all revenue arising from sales of same have been credited to it. The following table shows the detailed account:—

COMMERCIAL ORCHARD.

S Cts. S Cts.	-					
1911	Date	e. Work engaged in.		Cost.	1 horse 27 cents; 2 horse 34 cents; 3 horse 41 cents;	Cost.
1913.				\$ cts.		\$ cts.
Apr. 25 Pruning 1 man 2 hours 34 2 teams 20 hours at 34 cents 6 80	1912. 1913.	•••		19 50		23 90
May 25 Company			1 man 2 hours	31		
May 29 Spraying 25ton manure at \$1 25 00	May	25 Ploughing			2 teams 20 hours at 34 cents 1 team 5 bours at 48 cents 1 " 5 " 34 "	2 40 1 70
1			25ton manure at \$11	25 00		
1 Section	June	6 Digging couch grass.	4 " 20 "	4 42 3 57	1 11 2 11 27 11	
12	11	8 Planting garden	3 11 23 11		1 team 2½ hours at 27 cents	
1	ь	12 11 11	4 " 24 "	4 08 26	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	34 20
22 Digging couch grass. 3 men 15 hours. 2 55	17	19 Planting potatoes	1 " 1 "	17		
## 28 Digging couch grass	17	22 Digging couch grass	3 men 15 hours	2 55	** ************************************	41
25 Onions 2 6 1 1 1 1 1 1 1 1 1	11	23 Digging couch grass	4 " 26 "	4 42		
25 Hoeing 3 6 1 102 17 1 1 1 1 1 1 1 1		onions	2 " 6 "		1 toam 4 hours at 97 conts	1 60
2 Harrowing down potatoes 2 1 1 34 1 1 1 1 1 1 1 1 1	11	25 Hoeing	3 11 6 11	1 02		
July 6 Hr 25 43 43 43 44 47 47 47 47		29 Harrowing down potatoes.		04]		
10 Hoeing 2 1 4 68		8 a	3 , 104 ,	1 75		
" 11 Hoeing 3 " 6 " 1 02 " 16 " 2 72 "		19 Hoeing	2 " 4 "	68		41
16 Cultivating		11 Hoeing	3 11 6 11	1 02		
" 17 "	12	16 Cultivation	2 " 6 "	1 02		1.00
" 24 Cultivating	17	17 "	1 " 7 "!	1 19	1 " 7 " 27 "	1 89
ing stone	17	24 Hoeing.	3 men 6 hours	1 02		
Aug. 6 Hoeing		25 hoeing and pick-	5 men 424 hours	7 23		. 03
" Wultivating it team 2 nour at 27 cents	Aug.	6 Hoeing	2 10	1 70	I team ½ hour at 27 cents	14

NAPPAN.

COMMERCIAL ORCHARD, -Continued.

Date.	Work eugaged in.	Manual labour at 17 cts. per hour.	Cost.	Horse Labour and Teamster, 1 horse 27 cents; 2 horse 34 cents; 3 horse 41 cents; 4 horse 48 cents.	Cost.
			\$ cts.		\$ cts.
8 n 10 n 1	Ridging potatoes. Hoeirg. Spraying Hoeing and picking beans. Picking beans Dipping trees. Hoeing. Setting strawberries. Picking cucumbers. Picking cucumbers. Picking cucumbers. Pulling beans. Pulling beans. Pulling onions. Gathering onions, etc. Removing vines, etc. Cutting corn. Digging potatoes.	1 man 8 hours 2 men 4 3 27 3 7½ 3 7½ 3 7½ 3 7½ 3 7½ 3 22 22 22 22 22 22 22 22 22 23 3 4 12 24 2 24 2 2 3 4 1	1 36 68 4 59 1 28 1 79 1 36 51 85 34 34 34 2 01 1 51 17 43 7 65 6 29	1 team 3 hours at 27 cents 1	81 81 54 27 68 68
Nov. 10	Cutting cabbage. Digging potatoes. Pullingturnips and parsnips Covering strawberries. Garden seed Strawberry plants. Seed potatoes.	1 " 8 "	1 36 2 21 60 34 7 65 18 00 5 00	i team 1 hour at 34 cents i team 2 hours at 34 cents	34 68
		Manual labour	·	Horse labour	122 96 \$400 92

REVENUE.—Revenue from form r year, \$70.20; from sale of peas, beans, lettuce, cucumbers, tomatoes, carrots, caulifi wer, cabbage, pumpkins, potatoes, corn, turnips, squash, vegetable marrow, Brussel sprouts and onions, 1915, \$115.66; total revenue, \$196.16.

This orchard, which was established in 1911, is making a very satisfactory growth and came through the winter in fairly satisfactory condition. A few trees died from root injury sustained during the very severe weather in March, when the ground was unprotected with snow. These will be replaced as soon as possible.

A series of cover crop experiments were started in this orchard this year for the purpose of testing the value of various crops for this purpose and also to determine, if possible, the best method to follow in handling same. The following is an outline of the experiment:—

Block No. 1 received clean cultivation up to the middle of July, when cover crops of crimson clover and common vetch were sown. This will be ploughed under in the spring and followed by clean cultivation until the middle of July, as before.

Block No. 2 was seeded with the same mixture, at the same time. In this plot, however, the growth of only one side of the rows of trees will be turned under, the other being left. This process is reversed every year, that is, one side turned under one spring and the other the next.

Block No. 3 was permanently seeded with a grass mixture and the crop will be cut and left lying on the ground.

Block No. 4 was also permanently seeded. The crop from this, however, will be cut and removed.

Blocks 1 and 2 contain four rows of trees each, thus permitting a test to be made of four crops at the same time, one row in each block being given to the same crop.

PLUMS, PEARS AND CHERRIES.

The returns of the plums, pears and cherries were very light this season. This orehard is now practically past its usefulness, having been started in 1891-92. Several of the trees are missing and the remaining ones lack vigour. A brief summary of the results obtained in the variety tests of the 80 varieties plums, 42 varieties cherries and 40 varieties pears is given below. Those results of course apply chiefly to this section of Nova Scotia. It should be noted that the site of this orchard was very exposed and the test was, therefore, a most severe one.

PLUMS, Results of Variety Tests.

Variety.	Class.	Quality.	Hardiness.	Productive- ness.	Adaptability for this Section.
Abundance	Jap	Medium	Delicate	Good	Good.
Anaster	July		Derivate		Poor.
Arch Duke	Eur	Medium	Medium	Good	Good.
Apple Plum		1	Delicate		Poor.
Baker Prune	Eur	Medium	Hardy	Good	Good.
Black Hawk	Am	°)00r	Hardy	Good	Fair.
Bohemian	Eur	Medium	Hardy		Fair.
Botan	Jap	Poor	Hardy	Good in alter-	- 04221
	1 *			nate years	Fair.
Bradshaw	Eur	Good	Hardy	Good	Good
Bryanston Gage	Eur	Good	Hardy	Good	Good
Chenev	\m	Good	Hardy	Medium	Fair.
Coe Golden Drop	Eur	Medium	Delicate	Medium	Fair.
Columbia	Eur	Good	Medium	Medium	Fair.
Consul	\m		Medium.		
Damson	Eur	Good	Hardy	Good	Good.
Diamond	Eur	Good	Medium	Good	Very good.
Don	\m		Delicate		Poor.
Duane Purple	Eur	Good:	Medium	Medium	Poor (very
					susceptible to
					B.K.)
De Soto	.\m .	Wedium .	Medium		
Emerald	Eur	300d	Medium	Good	Fair.
Fellenberg (I. Prune)	Eur	air	Hardy	Good	Fair.
Field	Eur	300d	Medium	Good	Fair.
Cerman Prune	Eur	decium	Hardy	Good	Good.
Giant Prune	Eur		Delicate		Poor.
Glass Seedling		Medium	Hardy	Medium	Fair.
Goliath	Eur	300d	Medium	Good	Fair.
Grand Duke	Sur	rood	Hardy	Good	Good.
Gueii	Eur	Medium	Hardy	Good	Good.
Hawkeye	Am	Good	Medium	Good	Good.
Hudson River Purple Egg	Eur	Good	Delicate	G1	Poor.
Hughes	Am	Good	Hardy	Good	Good.
Improved Lombard	Eur	Good	Delicate	Good	Poor.
Imperial Gage	Eur	Good	Hardy Medium	Good	Good.
Jefferson	Eur Eur	G00d	Delicate		Fair.
John A	Eur		Hardy		Poor.
		Fair		Medium	Fair.
La Hermosa	Eur	Lan	Hardy	medium	
					Poor.
	100				
Leonard	\m		Hardy		
Leonard	Am Am . Eur		Hardy	Crost	Goo L

Plums, Results of Variety Tests.—Continued.

` Varicty.	Class.	Quality.	Hardiness.	Productive- ness.	Adaptabilit for this Section.
1. N 1.	17	Good	M . 1:	G 1	D. t.
Lucombe Nonesuch	Eur	Good	Medium	G00a	Fair.
Ic Laughlin	Eur		Hardy		
Mollie	Am	Poor	Hardy		Poor.
Monarch	Eur	Good	Medium	Good	Very good
Ioore Arctic	Eur	Medium	Medium		Fair.
Iariana	Am	and Contract of the contract o	Hardy	0004	~ WII .
gon	Jap	Medium	Hardy	Medium	Fair.
old Gold	Am		Hardy	Good	Fair.
Prange	Eur	Medium	Medium	Good	Fair.
scar			Hardy		
Pullin Golden	Eur	Good	Hardy	Medium	Fair.
ond Seedling		Good		Medium	Fair.
rince Yellow Gage	Eur	Good	Medium	Good	Fair.
	Eur		Hardy		
rincess Louise	Eur		Hardy		
Ouackenboss	Eur	Fair	Hardy	Medium	Fair.
led Egg	Eur	Fair	Medium	Medium	Fair.
Reine Claude	Eur	Good	Hardy	Good	Good.
Reine Claude de Montmorency	Eur	Good	Medium	Good	Fair.
Rockford	Am		Medium		
Collington Gage	Eur		Hardy		
aunders	Eur	Good	Medium		Fair.
hipper Pride	Eur	Good		Good	Fair.
mith	Eur	Good	Medium	Medium	Fair.
paulding	Eur,	Guod		Good	Good.
toddard	Am	Good	Poor	Medium	Poor.
ennant Prun	E ir	L	Poor		Poor.
ngarish	Eur	Good	Hardy	Good	Good.
ictoria	Eur	Good	Hardy		Good.
Vashington	Eur	Good	Medium	Poor	Poor.
ayland	Am		Poor		Peor.
eaver	Am				Poor.
olf		Good		Medium	
hyte Seedling	Am				Fair.
ellow Egg	Eur	Medium	Hardy		Fair.
Yellow Moldavka	Eur	Medium	Hardy	Good	Fair.

Pears, Variety Tests.

				I
Alma	Medium	Hardy	Medium	Fair.
	Good			Poor.
Bessemianka.	Poor	Good	Good	Fair.
Beurre Clairgeau	Good	Good	Good	Good.
		Good		
Beurre d'Aniou		Medium	Medium	Fair.
Beuere Superfin		Mediani		
Beurre Hardy		Good	Medium	Good.
Bezi de La Motte			Good	
Clapp Favorite			Good	
Dana Hovey	Fair	Good	Poor	Poor.
Dempsey	Good	Poor		Poor.
Doyenne Boussock.		Good	Good	Fair.
Dr. Reder		Fair		Poor.
Duchess	Good	Fair	Fair	Fair.
Fame		Poor:		Poor.
Fredrick Clapp		Poor		Poor.
Flemish Beauty	Good		Good	Good.
Giffard	Fair	Good	Fair	Fair.
	Fair		Good	Poor.
	Fair	Good	Poor	Fair.
Idaho		Poor		Poor.
Japan Golden Russet	Fair	Good	Good	Fair.
Kieffer	Poor	Fair	Good	Fair.
Koonce		Good	Good	Fair.

Pears, Variety Tests.—Continued.

Variety,	Quality.	Hardiness.	Productive- ness.	Adaptability for this Section.
				Fair.
Louise Bonne			Good Fair	Good.
Matilda		Good		
Mt. Vernon	Poor Fair		Good	Fair. Poor.
Osband Summer	Good		Fair	Good.
President Drouard	Good	Poor		Poor.
RutterSeckel	FairGood	Fair	Good	Fair. Good.
Sheldon.	Fair	Good	Fair	Fair.
	Poor	Poor		Poor.
Triumph			Good	Poor.
Tyson Vermont Beauty		Coor	Good	Good. Poor.
Wilder	Good	I oor	Fair	Poor.

CHERRY, Variety Tests.

73 1 2 (4 11)	77.	(1 1	77	-
Baird Seedling	Fair	Cood	Fair	Fair.
Black Tartarian	Good	Fair	Fair	Tair.
Belle Magnifique	Poor	Good	Fair	Fair.
Bessarabian		Poor		Poor.
Black Eagle	Good	Fair	Fair	Fair.
Black Heart	Good	Fair	Fair	Fair.
Downer Late Red	Good	Fair	Fair	Fair.
Double Natte		Poor		Poor.
Dyehouse	Fair	Good	Good	Good.
Early Purple.	Good	Fair	Fair	Fair.
Early Richmond	Good	Good	Good	Good.
Elton	Fair	Good	Good	Good.
English Morello	Good	Good	Good	Good.
Fouche Morello		Poor		Poor.
Governor Wood	Good	Poor	Good	Poor.
Grunner Glas	Fair	Good	Fair	Fair.
Ida		Fair		
Knight Early Black	Fair	Good	Good	Good.
La Victoria.		Fair		
Leib	Fair	Good	Fair	Fair.
Lithaur		Good		
	Fair	Good	Fair	Fair
Louis Philippe	Fair	Good		
Louis Philippe	FairGood	Good	Fair	Good.
Louis Philippe May Duke Montmorency	Fair	Good Good Fair.	Fair	Good. Fair.
Louis Philippe. May Duke Montmorency Montmorency d'Ordinaire.	Fair. Good. Good. Good.	Good Good Fair. Good	Fair Fair Fair	Good. Fair. Good.
Louis Philippe. May Duke. Montmorency Montmorency d'Ordinaire. Mozel.	Fair. Good. Good. Good. Good.	Good. Good. Fair. Good. Poor.	Fair	Good. Fair. Good. Poor.
Louis Philippe. May Duke Moutmorency Montmorency Montmorency d'Ordinaire. Mezel. Xapoleon	Fair. Good. Good. Good. Good. Fair.	Good. Good. Fair. Good. Poor.	FairFairFair	Good. Fair. Good. Poor. Poor.
Louis Philippe. May Duke Moutmorency Montmorency d'Ordinaire. Mezel Napoleon Ohio Beauty	Fair. Good. Good. Good. Good. Fair.	Good Good Fair Good Poor Poor Good	Fair Fair Fair Fair Good Good	Good. Fair. Good. Poor. Poor. Good.
Louis Philippe. May Duke. Montmorency Montmorency d'Ordinaire. Mezel. Napoleon Ohio Beauty Orel 25.	Fair. Good. Good. Good. Good. Fair. Fair. Fair.	Good Good Fair Good Poor Poor Good Good	Fair Fair Fair Fair Good Good	Good. Fair. Good. Poor. Poor. Good. Good. Good.
Louis Philippe. May Duke Moutmorency Montmorency d'Ordinaire. Mezel. Napoleon Ohio Beauty Orel 25. Ostheim.	Fair. Good. Good. Good. Good. Fair. Fair. Fair. Fair.	Good Good Fair Good Poor Poor Good Good Good	Fair Fair Fair Fair Good Good Fair	Good. Fair. Good. Poor. Poor. Good. Good. Good. Fair.
Louis Philippe. May Duke. Montmorency Montmorency d'Ordinaire. Mezel. Napoleon Ohio Beauty Orel 25. Ostheim Rockport.	Fair. Good. Good. Good. Good. Fair. Fair. Fair. Good.	Good. Good. Fair Good. Poor. Poor. Good. Good. Good. Good. Poor.	Fair Fair Fair Fair Good Good Fair	Good. Fair. Good. Poor. Poor. Good. Good. Good.
Louis Philippe. May Duke Moutmorency Montmorency d'Ordinaire. Mezel. Napoleon Ohio Beauty Orel 25 Ostheim. Reckport. Shew Seedling	Fair. Good. Good. Good. Good. Fair. Fair. Fair. Fair.	Good. Good. Fair Good. Poor. Coorl Good. Good. Good. Good. Good. Good. Good.	Fair Fair Fair Fair Good Good Fair	Good. Fair. Good. Poor. Poor. Good. Good. Good. Fair.
Louis Philippe. May Duke Montmorency Montmorency d'Ordinaire. Mezel. Napoleon Ohio Beauty Orel 25. Ostheim Rockport. Shew Seedling Simbirsk.	Fair Good Good Good Fair Fair Fair Fair Good Good Food Food Food Food Good Food F	Good. Good. Fair Good. Poor. Cood. Good. Good. Good. Cood. Foor. Cood. Foor. Cood. Foor.	Fair Fair Fair Fair Fair Good Good Good Fair Fair	Good. Fair. Good. Poor. Poor. Good. Good. Good. Fair. Poor.
Louis Philippe. May Duke. Montmorency Montmorency d'Ordinaire. Mezel. Napoleon Ohio Beauty Orel 25. Ostheim Rockport. Shew Seedling Simbirsk. Spath Amarelle.	Fair. Good. Good. Good. Good. Fair. Fair. Fair. Good.	Good Good Fair Good Poor Cood Good Good Poor Cood Fair Good	Fair Fair Fair Fair Good Good Fair	Good. Fair. Good. Poor. Poor. Good. Good. Good. Fair.
Louis Philippe. May Duke Montmorency Montmorency Montmorency d'Ordinaire. Mezel. Xapoleon Ohio Beauty Orel 25. Ostheim Rockport. Shew Seedling Simbirsk Spath Amarelle. Spathawke Honey	Fair. Good. Good. Good. Good. Fair. Fair. Good. Fair. Fair. Fair.	Good Good Fair Good Poor Cood Good Good Good Fair Good Fair	Fair Fair Fair Fair Good Good Fair Fair Good Good Good Good Good	Good. Fair. Good. Poor. Poor. Good. Good. Fair. Poor.
Louis Philippe. May Duke. Montmorency d'Ordinaire. Mezel. Napoleon Ohio Beauty Orel 25. Ostheim Rockport. Shew Seedling Simbirsk. Spath Amarelle. Spathawke Honey Suda Hardy.	Fair. Good. Good. Good. Good. Fair. Fair. Good. Fair. Fair. Fair. Fair. Fair.	Good Good Fair Good Poor Cood Good Food Fair Good Fair Good Fair Good	Fair Fair Fair Fair Good Good Fair Fair Good Good Fair Fair Fair	Good. Fair. Good. Poor. Foor. Good. Good. Fair. Fair. Fair.
Louis Philippe. May Duke Moutmorency Montmorency d'Ordinaire. Mezel. Napoleon Ohio Beauty Orel 25 Ostheim Rockport. Shew Seedling Simbirsk. Spath Amarelle Sparhawke Honey Suda Hardy Tradescants.	Fair. Good. Good. Good. Good. Fair. Fair. Good. Fair. Fair. Good.	Good Good Fair Good Poor Cood Good Good Fair Good Fair Good	Fair Fair Fair Fair Good Good Good Fair Fair Fair Good Good Good Fair Good	Good. Fair. Foor. Good. Good. Good. Fair. Fair. Fair. Good.
Louis Philippe. May Duke. Montmorency Montmorency d'Ordinaire. Mezel. Napoleon Ohio Beauty Orel 25. Ostheim Rockport. Shew Seedling Simbirsk. Spath Amarelle. Spathawke Honey Suda Hardy. Tradescants. Treens Seedling.	Fair. Good. Good. Good. Good. Fair. Fair. Good. Fair. Fair. Fair. Fair. Fair.	Good Good Good Fair Good Poor Cood Good Good Fair Good Fair Good Fair Good Fair Good Fair Good Good	Fair Fair Fair Fair Good Good Fair Fair Good Good Fair Fair Fair	Good. Fair. Foor. Good. Good. Fair. Fair. Fair. Good. Good. Good. Good. Good. Good. Good.
Louis Philippe. May Duke. Moutmorency Montmorency d'Ordinaire. Mezel. Napoleon Ohio Beauty Orel 25. Ostheim Rockport. Shaw Seedling Simbirsk. Spath Amarelle Sparhawke Honey Suda Hardy. Tradescants. Treens Seedling Vacining	Fair. Good. Good. Good. Good. Fair. Fair. Good. Fair. Fair. Good.	Good Good Fair Good Foor Good Good Good Fair Good Fair Good Fair Good Fair Good Fair Good Fair	Fair Fair Fair Fair Good Good Good Fair Fair Fair Good Good Good Fair Good	Good. Fair. Foor. Good. Good. Good. Fair. Fair. Fair. Good.
Louis Philippe. May Duke Moutmorency Montmorency d'Ordinaire. Mezel. Napoleon Ohio Beauty Orel 25. Ostheim. Reckport. Shew Seedling Simbirsk Spath Amarelle. Spathawke Honey Suda Hardy Tradescants Treens Seedling Vladimir	Fair. Good. Good. Good. Fair. Fair. Good. Fair. Fair. Good. Fair. Fair. Fair. Fair.	Good Good Fair Good Poor Cood Good Good Good Fair Good Good Foor Good Fair Good Fair Good Fair Good Fair Good Fair Fair Fair Fair Fair Fair Fair Fair	Fair Fair Fair Good Good Good Fair Fair Fair Good Good Good Good Good Good Good Goo	Good. Fair. Good. Foor. Good. Good. Fair. Fair. Fair. Good. Good. Foor.
Louis Philippe. May Duke. Montmorency d'Ordinaire. Mezel. Napoleon Ohio Beauty Orel 25. Ostheim Rockport. Shew Seedling Simbirsk. Spath Amarelle. Spathawke Honey Suda Hardy. Tradescants. Treens Seedling. Vladimir. Weir. Windsor.	Fair. Good. Good. Good. Good. Fair. Fair. Good. Fair. Good. Fair.	Good Good Good Fair Good Poor Good Good Foor Good Good Fair Good Foor Good Foor Good Foor Foor Good Foor Foor Good Foor Foor Good	Fair Fair Fair Good Good Fair Good Good Good Good Good Good Good Goo	Good. Fair. Fair. Fair. Good.
Louis Philippe. May Duke Moutmorency Montmorency d'Ordinaire. Mezel. Napoleon Ohio Beauty Orel 25. Ostheim. Reckport. Shew Seedling Simbirsk Spath Amarelle. Spathawke Honey Suda Hardy Tradescants Treens Seedling Vladimir	Fair. Good. Good. Good. Fair. Fair. Good. Fair. Fair. Good. Fair. Fair. Fair. Fair.	Good Good Fair Good Poor Cood Good Good Good Fair Good Good Foor Good Fair Good Fair Good Fair Good Fair Good Fair Fair Fair Fair Fair Fair Fair Fair	Fair Fair Fair Good Good Good Fair Fair Fair Good Good Good Good Good Good Good Goo	Good. Fair. Good. Foor. Good. Good. Fair. Fair. Fair. Good. Good. Foor.

SMALL AND BUSH FRUITS.

Sixty-four varieties of strawberries were again tested in plots \%28 acre in size. Several of these plots were entirely winter-killed, yet the total crop was an average one. The following are the yields of those plots which survived:—

Variety.	First ripe fruit.	Date of last picking.	Per Acre.
			Quarts.
windle	July 7	July 27	4,22
isel	7	" 27	11.3
rescent	" 7	" 31	5, 28
da	6	27	4,42
ean d'Arc	" 2	" 31	5,80
fton.,	" 4	" 27	14, 12
i. H. Coughill	4	" 31	12,6
enator Dunla,	4	27	8, 4
lyde	" 3	" 31	9, 3
ovett	" 3	" 27	6, 7
Taggie	٤٠ 6	" 27	3,4
arly Beauty	" 2	" 27	4.4
/arfield	" 3	Aug. 7	9,5
randy wine		July 31	8,5
eedling No. 15	" 7	" 31	5,0
Volverton	" 3	" 27	10, 1
andy	" 2	" 27	8.8
t. Antoine de Padue	" 6	" 21	3,9
aptain Jack	" 6	" 31	7.7
aris King	" 4	" 27	3,1
erdling No. 12	4	27	8,8
ohn Little	. 3	27	22.7
linute Man	. 6	27	2,9
oe	" 8	" 31	4.3
arton	6	27	8,9
uccess	" 7	" 31	3.8
arlton	" 7	" 31	6.7
len Mary	" 2	Aug. 7	10.0
ederwood	" 3	July 31	10, 5
ample	" 9	27	3,6
ick Ohmer	9	. 27	4,0
m. Belt.	" 9	" 27	4.8
. W. Beecher	" 3	" 27	10, 2
ole Seedling	·- 9	" 27	3.1
ichel Early	6	25	8.9
hompson Late	" 7	66 97	12.5
Leverland	6	31	7.1
quinox	66 0	" 21	8.1
quito a contract of the contra	0	21	0,1

The bush fruit plantation gave small returns. This was due to a large extent to the unfavourable nature of the soil which was the site of this plantation.

The results of the test conducted with those fruits during the last few years indicate the following varieties as being best suited to this locality: Currant (Black): Victoria, Eagle, Climax, and Kerry. Currant (Red): Red Grape, Cumberland, Wilder, Red Dutch, and Pomona. Currant (White): Large White and White Cherry.

VEGETABLES.

The results of the vegetable tests this season were far from satisfactory. This was due to the unsuitability of the soil, lack of germinating power in the seeds and unfavourable weather conditions. As before stated, these tests were made in the commercial orchard. Such vegetables as cabbage, onions, tomatoes, celery, Brussels sprouts, etc., were started under glass during the first week of April, and the beans, peas, carrots, beets, turnips, parsnips and cauliflowers were sown in the open ground.

The following tables give comparative yields of some of the more important

vegetables:-

PEAS (Sown in open soil June 4).

	Variety.	Length of row.	Ready for use.	Yield in pounds.
1. 2. 3. 4. 5. 6. 7. 8.	Stratagem Thomas Laxton Telephone American Wonder Premium Gem Gradus Sutton Excelsior Heroine	Feet. 30 30 30 30 30 30 30 30 30 30 30 30	Aug. 20	1 83 2 344 45 2 3 445 15
10. 11. 12. 13. 14.	Gregory Surprise. McLean Advancer Dainty Duchess. Early Giant Quite Content. The Lincoln.	30 30 30 30 30 4	" 12 " 12 " 13 " 13	23.16 3.15 2.18 2.18 2.18 2.18 4.18

^{*}Poor germination. †Did not germinate.

BEANS (Sown June 8).

Variety.	Length of row.	Ready for use.	Yield in pounds.
1. Extra Early Refugee. 2. Valentine (Red) 3. Wandwell Kidney Wax. 4. Stringless Green Pod 5. Refuge or 1000 to 1. 6. Extra Early Valentine. 7. Kveney Rustless Wax. 8. Grennell Rustless Wax. 9. Bountiful Green Bush.	Feet. 30 30 30 30 30 30 30 30 30 30 30 30 30	Aug. 16 " 17 " 18 " 18 " 12 " 15 " 17 " 20 " 17	23 14½ 40¼ 17¾ 16¼ 11½ 28½ 9 23

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CABBAGE (Sown under glass March 26).

	Variety.	Length of row.		eady for use.	Yiel	d.
		Feet.			Heads. P	ounds.
1.	Large Late Flat Drumhead	30 30	Aug.	20	19 19	97
3.	Lubeck.	30	46	10	19	95 85
4.	Magdeburg	30	"	10	15	72
5,	Small Erfurt.	30	66	1	20	
6.	Winningstadt	30	66	15	16	85
7.	Danish Ballhead Danish Delicatesse Red	30 30	- 66	15	19 20	52
9.	Danish Summer Ballhead.	30	66	20		46
10.	Flat Swedish.	30	4.6	10	17	130
11.	Extra Amager Danish Ballhead	30 -	66	10	13	- 56
12.	Cop shagen Market	30	- 66	15	15	65

TOMATOES (Sown under glass April 8).

	Variety.	No. of Plants.	Ready for use.	Total Yield. Green, and ripe
1. 2. 3. 4. 5. 6. 7. 8.	Chalk Early Jewel Runnies XNN Earliest Flotida Special Alacrity Extremely Early I. X. L. Prosperity Northern Adirondack Earliana Grade No. 1. Jack Rose.	5 5 5 5 5 5 5 5	Sept. 20 12	Pounds. 15 704 531 81 741 68 7234 661

Cucumbers (Sown June 8).

	Variety.	No. of hills.	Ready for use.	Yield in pounds.
2. 3. 4.	Giant Pera. Peerless White Spine. Cool and Crisp. Ptize Pickling. Extra Early Russian.	2 2 2 2 2 2	Sept. 1 1 Aug. 27 28 28 25	38½ 72½ 38½ 110¼ 100½

SQUASH (Sown June 8).

Variety.	No. hills.	Yield in Pounds.
Summer Crookneck. Delicata. Custard Marrow (White Bush). Long White Bush Marrow. White Congo. Mammoth Whale. Hubbard. Golden Hubbard Delicious. Long Vegetable Marrow.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	33½ 23 23 55 103 64 12½

CARROTS (Sown June 4).

Variety.	Length of row.	Ready for use.	Yield in pounds.
1. Improved Nantes	ft. 30 30	Aug. 15 Aug. 15	29 43

Beets were a total failure owing to the seed failing to germinate; cauliflowers germinated very poorly, and the carrots and parsnips also showed lack of vitality.

Fourteen varieties of garden corn were planted, but the plants came along very slowly and none of the varieties matured. Six varieties of onions were started in the hotbed and transplanted to the garden in June. These also proved unsatisfactory, practically all of the plants growing into thicknecks only.

Five varieties of celery were started in hotbeds, pricked off the following month and transplanted to the open in June. The soil in which these plants were placed was a deep dark loam in excellent condition. Very satisfactory growth was made during the summer, some of the plants reaching twenty inches in height. Unfortunately a large percentage of the plants went to seed, thereby considerably reducing the yield. The following were the results obtained:—

CELERY.

Variety.	No. Plants.	Total yield.	Per cent
1. Paris Golden Yellow. 2. Giant Pascal. 3. French Success 4. Noll Magnificent. 5. White Plume.	30 30 30 30 30 30	lb. 63 54 66 48 75	30 90 83·6 40 20

Variety tests of vegetables have been conducted at this Station for a considerable number of years, and the following list is compiled from the results obtained during that time:—

Vegetables.	Variety.	Years in test.	Results.
Onion	Johnston Dark Red Beauty. Danvers Yellow Globe. Salzer Wethersfield. Large Red Wethersfield Dark Red Wethersfield Southport Red Globe. White Globe. Red Globe.	4 6 4 4 1 1	Medium. Good. Medium. Good. Medium.
Celery	Paris Golden Yellow. Giant Pascal. Rose Ribbed Paris. French Success. Noll Magnificent. Evans Triumph. White Plume.	7 5 3 3 2 4	Good, Good, Medium, Medium, Medium, Medium,
Cabbage	Early Jersey Wakefield Early Paris Market. Fottler Improved Drumhead Large Late Flat Drumhead Extra Early Midsummer Savoy Fottler Improved Brunswick. Lubeek Magdeburg Small Erfurt. Winningstadt. Danish Ballhead Danish Ballhead Flat Swedish. Improved Amager Danish Roundhead Extra Amager Danish Ballhead Copenhagen Market.	10 3 1 4 3 5 4 4 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	Good. Cood. Good. Good. Good. Good. Medium. Medium. Medium. Medium. Medium. Modium. Medium. Medium. Medium. Medium. Medium. Medium. Medium.
Cabbage (Red)	Extra Dark Red Dutch	1 1 3	Medium. Good. Good.
Cauliflower	Danish Giant Early Snowball. Extra Selected Early Erfurt Dwarf.	4 8 7	Good. Good. Good.
Brussels Sprouts	Dwarf Improved	4	Good.
Tomatoes	Sparks Earliana Chalk Early Jewel Bonny Best Trophy Matchless Livingston Globe Rennie XXX Earliest Florida Special Alacrity. First of All. Extremely Early I.X L. Plentiful Prosperity Greater Baltimore. Northern Adirondack Earliana. Jack Rose	.3	Good. Good. Good. Good. Medium. Good. Medium. Good. Medium. Food. Good. Medium. Good. Medium. Medium. Poor. Good. Good.

VARIETY Tests of Vegetables, etc.—Continued.

Vegetables.	Varieties.	Years in test.	Results.
Peas	Stratagem	11	Good.
	Thos. Laxton	10	Good.
	Telephone American Wonder	9	Good.
	Premium Gem	13	Medium.
	Gradus.	12	Medium.
	Sutton Excelsior	4	Good.
	Heroine	8	Medium.
	Juno	8	Good.
	Gregory Surprise	4 4	Good.
	Paragon	î	Fair.
	Nott Perfection. Dainty Duchess Early Giant Quite Content.	Ī	Medium.
	Dainty Duchess	1	Medium.
	Early Giant	1	Medium.
	The Lincoln	1	Medium. Poor.
	The Emcon.	1	12 001.
Beans	Extra Early Refugee	4	Good.
	Red Valentine	6	Medium.
	Wardwell Kidney Wax	6	Good. Medium.
	Stringless Green Pod	2 5	Good.
	Challenge Black Wax	2	Medium.
	Landreth Double Barrelled	2	Poor.
	Dwarf Extra Early	6	Medium.
	Refugees or 1,000 to 1 Challenge Black Wax Landreth Double Barrelled Dwarf Extra Early Grennel Rustless wax Beautiful Green Bush	1	Poor. Good.
	beauthut Green Bush	1	Cooa.
Beets	Early Blood Red Turnip	3	Good.
	Eclipse	5 1	Good.
	Egyptian Dark Red Flat Black Red Ball	4	Good.
	Ruby Dulcet	4	Good.
	Meteor.	4	Good
'arrots	Chantenay	3	Medium.
	Chantenay Oxheart Nantes	3	Poor.
	Nantes.	3	Good.
	Improved Nantes	4 4	Good.
	French Horn	4	Medium.
	teact Horn		III COLIUMNI.
Lettuce	Cos Trianon	2	Medium.
	Red Edge Victoria	4	Good.
	Black Seeded Simpson. Grand Rapids	4	Good. Good.
	All Heart	4	Good.
	Giant Crystal Head	4	Medium.
	[mproved Hanson	4	Medium.
	Grand Rapids All Heart Giant Crystal Head Improved Hanson Crisp as Ice Iceberg Unrivalled Summer	4	Medium. Medium.
	Unrivalled Summer	2	Poor.
	Dark Green Capucine	2	Good.
	Rousseau Blond Winter	2	Poor.
	Forcing Turnip Scarlet	1	Good.
Radish	No Illin Illino	2	Medium.
	Rosy Gem	1	Medium.
	Rosy Gem. White Icicle Early Scarlet White Tip.	2 3	Medium. Good.
	Early Scarlet White Tip	3	Good.
Parsley	Double Curied	6	Good.
Salsify	Long White	4	Good.
Parsnips	Hollow Crown.	5 2	Good.
	1		PAN.

VARIETY Tests of Vegetables, etc.—Concluded.

Vegetables.	· Varieties.	Years test.	Results.
orn	Malakoff	2	Did not
			mature.
	Fordhook Early	3	Good.
	Golden Bantam	3	Medium.
	Early Evergreen. Black Mexican.	2	Poor.
	Stowell Evergreen	3	Poor.
	Country Gentleman	3	Medium.
	Henderson Metropolitan	3 2	Poor.
	Early Malcolm		Good.
•	Extra Early Adams	2	Did not
		2.0	mature
	Perkins Early	1	Did not
		2	Medium
	Early Iowa		Did not
	Early Dawn		mature
	Pocohontas	1	Did not
	1 oconontas		mature
	Perkins Extra Early Market	1	Did not mature
	C: . D	2	Medium.
Cucumbers	Giant Pera	5	Good.
	Cool and Crisp	2	Medium.
	Prize Pickling	2	Good.
	Extra Early Russian	2	Good.
Squash	Summer Crookneck	3	Medium.
Dquasii	Delicata	2	Medium.
	Custard Marrow, White Bush	2 .	Medium.
	Long White Bush Marrow	4	Medium.
	White Congo	2	Medium.
	Mammoth Whale	2 5	Good.
	Hubbard	5	Good.
	Trailing White Vegetable Marrow	2	Good.
	Golden Hubbard	2	Medium.
	Delicious. Long Vegetable Marrow.		Good.

As in previous years, uniform test plots of potatoes 1-100 of an acre in size were grown. These were planted in clay loam on June 11 and dug on October 15. Sixteen varieties were thus tested. Following are the results obtained:

J.	2
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Form and colour.	Bush. Lb. Round, flat, white. Round, whit
Yield per acre, of unmarket- able.	Lb. Bush, Lb. Bush, Lb. Bush, Lb. Bush, Lb. Co. Co. Co. Co. Co. Co. Co. Co. Co. Co
Yield per acre, of market-	Lb. 128 36 000 000 000 000 000 000 000 000 000
Yield per acre, rotten.	Bush, Lb. 235 24 24 282 24 236 226 22 236 226 22 236 226 226 226 2
Yield per acre, sound.	Bush. Lb. 283 18 283 18 283 18 283 18 283 18 285 36 28 285 48 285 48 285 42 205 30 206 36 1175 42 1176 36 36 1148 18 18
Total yield per acre.	
Average Size.	Medium """ """ """ """ """ """ """ """ ""
Character of growth.	Strong. Fair. Strong. Frong. Friendar. Frong. Friendar. Strong. Friendar. Strong. Friendar. Fri
Name of Variety.	Everett. Rawlings Kidney Wee McGregor Gold Colm. Gold Colm. Early Rose (Blair) Carman No. I. Rochester Rose. Rochester Purisan King Edward Irish Cobbler Fairly Rose Irish Rose. Wick Extra Early Nick Extra Early Morgan Seedling. Benty Rose. Morgan Seedling.

The building up of an improved strain of five varieties of potatoes by field election was started this year. The following varieties were the ones used: Irish Cobbler, Carman No. 1, Wee McGregor, Empire State and Rawlings Kidney.

The selection was made by having all hills in the test plots dug separately and then twenty-five of the best hills collected and weighed. All hills chosen had a high percentage of marketable potatoes of the proper type. Twenty-five average hills were also weighed for the purpose of comparison, and resulted as follows:—

Variety.	Selected Hills. Lb.	Average Hills. Lb.
1. Irish Cobbler	44 53 43 49 46	30 31 27 33 26

Next year this selected stock will be planted and again selected in the same way and the process continued indefinitely.

FLOWERS.

All flowers made very satisfactory growth and bloomed abundantly throughout a long season. Practically all of the annuals were started under glass and transplanted to the garden when the danger of frost had passed. The first sowing of seed was unfortunately a failure owing to the seeds not germinating, and this somewhat shortened the flowering season. The annuals grown included asters, alyssum, amaranthus, antirrhinum, balsam, bachelor button, candytuft, carnations, castor oil plant, centranthus, chrysanthemums, coreopsis, cosmos, daisy, larkspur, leptosiphon, lupinus, mignonette, nasturtiums, nemesia, pansies, phlox, poppy, salvia, Swan River daisy, verbena, everlasting and Clarkia.

Bulbs such as tulips, narcissi, gladioli, etc., made a good showing, but the greatest display was made by the dahlias, our collection of which is very fine. Thirty-five varieties of cactus, cactus hybrid, decorative, show and fancy show dahlias were grown.

An experiment was conducted with sweet peas to ascertain the effect of treating the seed with farmogerm. The peas were divided into four blocks, two being treated and two untreated. Observations were taken at various times during the season, but no difference could be noted.

The perennials bloomed well during the season and presented an attractive appearance. This border has been established some few years, however, and the plants are deteriorating in quality, some of the more desirable ones having died. An alteration is being effected in this feature of the ornamental grounds, and the new border will be in the form of a semi-circle instead of a straight bed as heretofore.

SHRUBS AND TREES.

All classes of shrubs and trees came through the winter in good condition and made satisfactory growth during the summer. The flowering shrubs made a particularly fine display during the summer months.

The various hedges are in a very healthy condition and require considerable attention. In one or two cases as many as five clippings had to be made. The Common Spiraea hedge was removed during August, for as it was making such rapid growth it threatened to interfere with the more desirable Norway Spruce hedge along-side of it.

NAPPAN.

EXPERIMENTAL STATION, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. SAXBY BLAIR.

This is the third annual report of work done at this Station, and covers such experiments as it is thought may be of value. The orchards have been extended by additional planting of some new varieties of apples, peaches, plums, pears and cherries. Trial tests have been made of different vegetables. The show of bloom from the annual and perennial flowers has been good. The orchard experimental work started last season at Berwick, Kings County; Falmouth, Hants County, and Bridgetown, Annapolis County has been continued with some additional experiments.

The fruit crop has on the average been a medium one. In some places the crop was light due largely to frost injury, at blossoming time, June 4. The development of seab on unsprayed trees was hardly as bad as the previous season. The fruit trees on the whole have been better sprayed during 1914 than ever before and as a result most of the fruit has packed out well with a greatly lessened percentage of scab. The first development of scab was later than last season and the spray just before the blossoms opened seemed to be the one of greatest value. The winter of 1914-15 has been a favourable one for fruit trees and no winter injury has been reported.

WEATHER.

The temperature during the latter part of April and the first half of May was fairly uniform with no very warm periods to force trees into bloom and as a result leaf buds did not open until after the middle of May. The first spraying work was quite general from the 18th to the 25th. The mean average temperature from April 15th to May 1st was 41·2 degrees Fahr.; from May 1st to 15th, 43·4 degrees, and from May 15th to 31st, 57·5 degrees. Frost was recorded at this Station May 1, 2, 12, 16, and 17 of 9, 4, 3, 2, and 1 degrees, respectively, and the temperature went to freezing on the 7th and 13th May. On June 4 our thermometer registered 32 degrees and the effect of the frost was noticeable at places on this Station. This frost was quite general through the valley but the temperature went low enough to do damage only in the lower lying areas along the Cornwallis Valley from Kentville to Kingston. Early blossoming varieties, especially the Gravenstein, suffered the most, and in some places the crop was a complete failure.

The mean average temperature for 1913 from April 15 to May 1 was 47.93 degrees Fahr.; May 1st to 16th, 44.73 degrees and May 16th to June 1st 47.97 degrees. For comparison it will be seen that the mean average from April 15th to May 15th in 1913 was 46.33 degrees, and for the same period in 1914, 42.3 degrees. The mean average for 1913 from May 15th to June 1st, 1913, was 47.97 degrees compared with 57.5 degrees in 1914. The season on the whole was favourable for fruit trees and where properly sprayed a good clean well-matured lot of fruit was secured. The first fall frost at this Station was on October 1st of 5 degrees. Frost was recorded on seven days during October, namely on the 1st, 7th, 14th, 15th, 25th, 26th, of 5, 6, 4, 3, 4, 6 and 7 degrees respectively. The month on the whole was a satisfactory one for harvesting the fruit crop.

The rainfell during the summer was ample except during July in which month only 1.45 inches of rain fell. The rainfall, however, during June was 4.2 inches which with good cultivation carried the trees through July without apparent injury.

The rainfall from May 1st to October was 28.75 inches. The sunshine during September was 173.8 hours and October 158.2 hours as compared with 156.6 in September, 1913, and 57.8 in October, 1913.

November was an exceptionally fine month with little frost to prevent ploughing throughout the whole month, and as a result much more fall ploughing than usual has been done. The first really cold weather was on the 19th when the thermometer registered 27 degrees of frost, this was followed by mild open weather until the 24th and 28th when 17 degrees was recorded and this was followed by mild weather. The rainfall during November was much less than usual and in many places a scarcity of water in wells has been reported. From the 2nd to the 11th there was sanshine on one day only, with a slight rainfall on eight days of this period.

From the 1st to the 5th of December was mild and ploughing was possible at this time. The first fall of snow was on the 11th of 1.62 inches. The next snowfall was on the 21st to 23rd when 8.02 inches made fair sleighing for Christmas. A thaw on the 29th and 30th took off all the snow. The coldest period was during Christmas week when the thermometer registered 6, 4 and 5 degrees below zero on the 25th, 26th

and 27th, respectively.

January was not a cold month. The thermometer registered \(\frac{1}{2}\) and 4 degrees below zero on the 5th, 30th and 31st as the coldest. The highest temperature was on the 7th and 19th of 51 and 56 degrees, respectively. The greatest daily range was on the 5th of 30 degrees.

There was good sleighing from the 21st to the 23rd only, and although 21·12 inches of snow fell during the month, this was followed by mild weather, or the snow was not of sufficient depth to make good sleighing. Sleighs were running in places more or less throughout the month. Rain fell during 12 days in the month. There were three heavy thaws during the month on the 7th, 19th, 20th and 24th, which took out practically all the frost in the ground and caused bad washing on our fields.

February was also mild after the first week. On the 2nd, 3rd, 4th and 5th, 9, 4, 2 and 7 degrees below zero were recorded respectively and after this date the temperature during the month never went below 10 degrees above zero. There was little snow during the month, a fall on the 1st of 4 inches made fair sleighing until the 6th when a thaw set in and there was no more sleighing during the month. There was little rain during the month.

March has been an even month with no extreme temperature. The snowfall was light and not sufficient to make sleighing except an occasional day. There was no rain and a snowfall of $9\frac{1}{2}$ inches. With no snow on the ground the usual washing from spring floods has been avoided.

METEOROLOGICAL RECORDS.

The mean average temperature, rainfall and hours of sunshine as recorded at the Experimental Station, Kentville, N.S., for the year commencing April, 1914, as compared with the previous year:—

	Commencing April 1, 1914.			Commencing April 1, 1913.			
${ m Month.}$	Mean Average Tempera- ture.	Rainfall.	Sunshine.	Mean Average Tempera- ture.	Rainfall.	Sunshine.	
	0	Inches.	Hours.	0	Inches.	Hours.	
April. May June July August September October. November December	36·8 50·72 56·2 62·88 63·0 57·6 49·5 36·4 22·89	2·33 1·46 4·2 1·45 2·58 3·65 1·90 3·19 2·58	196·0 189·6 250·3 238·9 -211·1 173·8 158·2 109·7 85·1	41·9 46·2 56·7 65·4 63·3 54·3 56·5 38·4 23·44	4·29 3·17 1·23 3·72 1·70 2·555 9·60 1·97 4·39	137·1 178·2 270·1 253·1 238·4 156·6 57·8 111·5 74·65	
JanuaryFebruary	22·83 25·6 26·81	4·75 1·25 0·95	73·4 99·6 103·1	19·68 14·19 30·72	2.80 2.59 3.73	91·8 118·7 118·2	
TotalAverage per month	511·23 42·6	30·29 2·52	1,888·8 157·4	510·73 42·56	41·74 3·47	1,804·95 150·41	
Total for 6 growing months April to Sept Average for 6 growing months, April to Sept		15·67 2·61	1,259.7	327·8 54·6	16·66 2·77	1,232·5 205·4	

GROUNDS AND ORNAMENTAL PLANTING.

The grass on the lawns has not been as good as we had wished for. The soil is sandy, dry and poor, which during the summer is not suitable for a nice lawn, and as a result the grounds are not as attractive during the summer months as they should be. The shrubs and trees have made fair growth during the year.

The bulbs planted the previous fall gave a fine show of bloom commencing with the crocus and scilla the latter part of April and finishing with the late tulips in the middle of June. The annual flowering plants were attractive. The petunias, schizanthus, phlox Drummondii, pansies, nemesias, godetia, snapdragons, and cosmos were particularly good. The asters were a failure. The plants were apparently healthy at the start but gradually weakened, turned a sickly yellow and gave imperfect bloom. There seems to be little known about this disease, and so far we have not been able to suggest a remedy.

SWEET PEAS.

Many sorts of sweet peas were grown. Six of the best sorts were: Nubian, dark maroon; Thomas Stevenson, orange scarlet; Maud Holmes, crimson; King White, white; Clara Curtis, cream; Asta Ohn, lavender; and Countess Spencer, pink. Additional good varieties are Mrs. Routzahn, shell pink; Helen Lewis, orange scarlet; Mrs. C. W. Breadmore, cream with pink edge; Moonstone, light lavender; Tennant Spencer, mauve; King Edward, crimson; John Ingman, pink; and Florence Nightingale, lavender.

Four varieties were started in pots in the greenhouse on the 18th March and

April 1st and planted out May 4th.

Ten pots of each variety were sown. Four-inch pots were used, and three plants were allowed to a pot. They were taken out of the pots without disturbing the soil and the contents of each pot planted one foot apart. The plants were well hardened off before planting out and made continuous growth afterwards. The early sown plants were about 8 inches high when planted and the later sown 6 inches. They were supported in the pots by small twigs to keep them upright. The following table gives the date of bloom as compared with the same varieties sown outside:—

DATE OF BLOOMING.

When started.	Beatrice Spencer.	King Edward Spencer.	Tennant Spencer.	Countess Spencer.
March 18 April I May 4	July 6	July 7 " 10 " 25	July 8	July 4. " 12. " 25.

VEGETABLES.

Tests were made of many of the different varieties of vegetables. A general summary is given below of the best kinds, the time the seed was started in flats, when the plants were set outside, and when fit to use.

Variety.	Seed Start	ed.	Plante	d out.	Fit to	use
Lettuce—All-Heart (cabbage head)						2
Grand Rapids (open head)	" 28		" 9.		July	1
Cabbage—Early Jersey Wakefield	" 28					
Paris Market	" 28 " 28		9.		66	1.
Summer Ballhead	4 28				August '	1
Cabbage—Early Jersey Wakefield,	Anril 15	,T	une 10		August	1
Paris Market	" 15		" 10		- 66	1
Medium—Copenhagen Market	15		" 10		66	2
Summer BallheadLate—Danish Roundhead	" 15 " 15		10.		Septemb	er i
Fottler Improved Drumhead	15		" 10.			1:
Late Flat Drumhead	" 15		" 10		66	1
Cauliflower—Early Dwarf Erfurt	March 28	lw	Tav 9		July	
Early Snowball	" 28		9		46	-
Comatoes—Alacrity	March 28	Jı	ine 8		August	
Earliana	" 28		" 8		"	13
Chalk Early Jewel	" 28		" 8		66	14
Celery—Paris Golden Yellow	March 26	Jı	ine 9		Septemb	e r 2 (
White Plume	" 26		9			20
Squash—Vegetable Marrow	May 9	Jı	ine 16		August	20
Boston Marrow			" 16		Septemb	
Red HubbardHubbard	9		" 16		66	12
Musk Melon—Earliest Ripe	March 28	M	lay 11 in	frame.	August	17
Paul RoseEmerald Gem	" 28		" 11 " 11	- 66	66	21
Montreal Market	" 23		" 11 .		66	. 22
			Plant	ed.		
Corn—Early Malcolm		Jı	ine 6		Septembe	er 6
White Cory			" 6			14
Crosby EarlyPremo			0		46	21
Golden Bantam			" 6			21
Canada Yellow			" 6		October	1
Country Gentleman			" 6		6.6	1
eas—Early, Gregory Surprise		M	ay 9		July	7
Second Early, Excelsior			" 9		66	14
" GradusLate, Admiral Dewey			ð.,		44	18 25
" Stratagem			37		4.6	26
" Juno (Dwarf)					4.6	27
eans—Grenell Rustless wax		М	ay 26		July	24
Wardwell Kidney wax. Red Valentine Green pod			26. 26.		3	26
Red Valentine Green pod			26			29
Refugee Green pod			20		August	. 9

	Seed Started in Flats.	Transplanted Outside.	How Matured.
Onions—PrizetakerAilsa GraigPrizetakerAllsa Craig		9	"
White Queen Australian Brown. Danvers Yellow. Extra Early Red.		11	Good. Fair.

ORCHARDS.

Additional plantings were made this year of orchard fruits, including the following trees, 208 standard apples, 94 pears, 41 cherries, 62 plums, 28 peaches, 5 Quinces, 36 dwarf apples on Paradise stock, 36 on Doucin stock and 18 dwarf pears on Quince stock. There have been 2,027 trees of apples, plums, cherries, pears, and peaches planted to date, including 1,068 apples, 259 pears, 175 cherries, 398 plums, 102 peaches and 25 quince and apricots. Forty-two acres are now planted to orchard fruits.

NUT TREES.

Two hundred and forty plants of filberts including 24 varieties of 10 trees each were set in rows of 20 feet apart and 10 feet apart in the rows. These were purchased from Barbier & Co., Orleans, France. Many of the plants failed to grow. Twenty Sober Paragon chestnuts and 16 English walnuts including 4 each of the varieties Rush, Pomeroy, Mayette and Franquette, and 4 Indiana pecan nut trees were planted on a side hill 40 feet apart. The Paragon chestnuts have for the most part made a good start. Some of the walnuts and pecans failed to start and those that did start made very poor growth.

SMALL FRUITS.

The bush fruits planted last season have made good growth. The cane fruits also did well except the blackberries of which Iceberg, Erie, Early Harvest, Blowers, Rathbun and Mersereau winter killed. Many of the grapes root killed and will be replaced. The following varieties of strawberries were added to those already planted: Tennessee Prolific, Howard Early, Virgilia, Julia, Mariana, Valeria, Portia, Desdemona, Ophelia, Cordelia, Cassandra, Williams, Enhance, Bubach, Lovett, Chesapeake and Excelsior. One thousand plants each of Stevens Late Champion, Senator, Dunlap, Sample and Pocomoke were also planted. The crop of berries on the plantation made last season was light.

HEADING BACK APPLE TREES AT PLANTING TIME.

The usual practice is to cut back the tops of young trees at planting time. This heading in, as it is called, is practised much more severely by some planters than others, and some even do not take the trouble to do it all. This experiment was conducted with the object of finding out just what the gain was and whether the cutting back was of the benefit claimed for it.

Wagener apple trees two years old and uniform in every particular were used. There were six trees to each test and the results are as tabulated below.

Plot.	How Headed.	Average 1913.	Growth 1914.
1 2 3 4	Three-quarters of the branches cut off	Inches. 4.82 3.5 1.96 1.00	Inches. 20.08 12.75 7.62 2.84

Measurements were taken of all the branches developed since planting and it will be seen that the trees not headed back have made very little growth.

Plot 1.—All the trees made good strong growth and required little pruning at the end of the second year after planting to put them in good shape.

Plot 2.—Made fair growth, but a few fruiting spurs had developed at the base of the branches on some trees which indicated weakened growth. A heading back will be necessary on some trees to increase vigour.

Plot 3.—The trees generally were weak and many fruit spurs had developed. A severe heading back will be necessary to induce a more vigorous growth.

Plot 4.—These trees have made little growth during the two years planted, are full of fruiting spurs and are stunted in appearance which will make it necessary to do severe pruning in order to induce vigorous growth.

EXPERIMENT TO DETERMINE THE VALUE OF FERTILIZING APPLE TREES WHEN PLANTED.

In order to obtain some information relative to the profitable use of a complete commercial fertilizer, nitrate of soda, or stable manure, for inducing a vigorous start of apple trees when first planted, a series of tests was started in the spring of 1913 using four varieties of apples of uniform grade on land which was practically uniform throughout.

The complete fertilizer used was home mixed and contained 4 per cent nitrogen, 8 per cent phosphoric acid, and 10 per cent potash; made up of nitrate of soda, acid phosphate and muriate of potash. This was used at the rate of 600, 1,200, 1,800, 2,400 and 3,000 pounds per acre. Nitrate of soda at the rate of 600 and 1,200 pounds per acre was also used on a series of plots, and manure at the rate of 15 tons per acre was used on another series.

On one half of the trees the fertilizer was scattered around the tree after it was set and worked into the soil by again digging the latter to a depth of 3 inches. On duplicate plots the fertilizer was thoroughly mixed with the soil dug out for planting

the tree. In each case, in order to make the experiment uniform, one square yard of soil to a depth of 10 inches was removed for planting the tree in, and one square yard of the soil was fertilized.

Four varieties of apples, Ribston, Milwaukee, Stark and Roxbury Russet (Non-pureil) were planted, and two trees of each were used in each experiment. The trees were two years' old and were selected stock of uniform grade. The trees were set 10 feet apart each way.

Measurements were made of all the wood growth of the branches on each tree for the years 1913 and 1914. The data given is the average number of inches of growth made by the eight trees in each plot of four varieties, two trees of each.

One of the objects of the test was to find out whether the application of large amounts of fertilizers would cause injury, it being anticipated that such would be the case. There was little difference, however, in the appearance of the trees over the whole block, and while the measurements show that the excessive use of fertilizers decreased growth slightly yet it cannot be said that there was injury. It would appear, however, that the trees were not helped by the fertilizers applied, and that with good cultivation the application of fertilizers to young trees is not necessary.

It is quite a common practice for those starting young orchards to fertilize the tree when it is set or soon after, and although the quantity used per acre around each tree is not large, yet the quantity used per acre fertilized is often much greater than the largest amount used in this test. If 2 ounces are used per square yard, the rate is 600 pounds per acre, and if \(\frac{1}{2}\) pound is used on a surface of one square yard the rate per acre is 2,400 pounds.

How trees were fertilized and growth in 1913 and 1914:-

How Fertilized.	Average In In	
	1913	1914.
cattered on the surface after planting and worked in to a depth of 3 inches.		
No. 1, 600 pounds per acre	7.6	21.1
No. 2, 1,200 pounds per acre		21.6
No. 3, 1,800 pounds per acre	5.7	22.0
No. 4, 2,400 pounds per acre	6.1	20.0
No. 5, 3,000 pounds per acre	6.5	21-2
fixed with the soil dug out for planting the tree in.	7.0	
No. 6, 600 pounds per acre		22.8
No. 7, 1,200 pounds per acre		19·5 16·6
No. 8, 1,800 pounds per acre	0 -	17.0
No. 9, 2,400 pounds per acre		14.2
No. 10, 5,000 pounds per acre. No. 11, Nitrate of soda, 600 pounds per acre spread on surface after planting and		14.2
worked in to a depth of 3 inches	5.4	22-6
No. 12, Nitrate of soda, 1,200 pounds per acre spread on surface after planting and		
worked in to a depth of 3 inches	5.8	18.7
No. 13 Check no fertilizer	5.7	23.3
No. 14. Manure, 6 pounds per tree, at rate of 15 tons per acre worked into soil after		
tree was planted	8.6	20.7
No. 15, Manure, 6 pounds per tree, at rate of 15 tons per acre worked into soil dug out	0.0	10.0
for planting the tree	8-3	18-8

POTATOES.

Thirty-eight varieties of potatoes were planted in plots of two rows, each 66 cet long and 33 inches apart, or ½20 acre each. They were planted May 28. Oats were grown on this ground the previous season, and as the land had been cleared of stumps the year previous to the oat crop, this was the first hoed crop it had produced. The soil was naturally a poor sandy loam, and up to this crop had not received fertilizer. The ground was ploughed in the fall and again in the spring and well worked. Bone meal at the rate of 400 pounds per acre was sown broadcast; also a complete fertilizer made up of 75 pounds nitrate of soda, 75 pounds sulphate of ammonia, 120 pounds muriate of potash, and 320 pounds 15 per cent acid phosphate. This made a fertilizer containing 4 per cent nitrogen, 8 per cent phosphorus and 10 per cent potash, applied at the rate of 600 pounds per acre, which was harrowed in before planting.

The sets were cut to three eyes to a piece, and were planted 14 inches apart in the rows. The plants were sprayed three times with Bordeaux mixture and twice with Paris green, using 1½ pounds Paris green and 3 pounds arsenate of lead to 100 gallons.

The crop was harvested October 7. The yield was extremely light throughout. The plots for the most part lacked vigour and seemed to make a poor start, due, no doubt, to lack of humus in the soil.

Name.	Marketable.	Not Marketable.	Total Yield.
	Bushels.	Bushels.	Bushels
arman No. 1	136	19	155
Vee McGregor	125	25	150
Conquering Hero	110	40	150
Oreer Standard	128	20	148
ir Walter Raleigh	127	20	147
	129	10	
Odd Wonder			139
lcIntyre	109	29	138
Freen Mountain	94	41	135
New Queen	109	23	132
ovee	105	19	124
awlings Kidney	93	29	122
old Coin	94	26	120
able Talk.	84	36	120
actor	85	33	118
arly White Albino	100	16	116
p-to-Date	102	12	114
rish Cobbler	80	33	113
ilver King	89	20	109
mpire State	89	20	109
cottish Triumph	79	27	106
ureka Extra Early	64	40	104
ish Cobbler	87	14	101
lyde	87	13	100
organ Seedling	89	10	99
anistee	88	9	97
almeny Hero	75	22	97
	70		
he Scott		26	96
equisition	66	30	96
obbie Prolific	77	16	93
low	70	19	89
arly Norther	74	9	83
arly Hebron	63	17	80
oulton Rose	71	6	77
an American	71	5	76
ew Scotch Rose	63	13	76
	62	11	73
urpee Extra Early	70		72
arly Rose		2	
arly May	60	3	63

KENTVILLE.

FERTILIZER EXPERIMENTS IN THE GREENHOUSE.

For the purpose of getting additional information as to the plant food requirements of our soils a series of tests were made in the greenhouse with fertilizers of different kinds on a virgin soil taken from a newly cleared field to a depth of 6 inches.

The soil was thoroughly mixed to render it entirely uniform and placed in a bench 5 inches deep. Each plot of one square yard was divided by a board across the bench

to keep each plot entirely separate.

Where the lime was used it was first applied and well worked into the soil, after which the other fertilizer used in the plot was scattered evenly over the surface and also worked into the soil.

Peas were used in this test. The seed was planted in openings made one inch deep in rows one and one-half inches apart. The seed was sown February 6th, and owing to the bench room being required 100 plants from each plot were lifted and weighed March 30

An examination of the table given herewith leads us to believe that the newly broken land at this Station is decidedly deficient in phosphorus. It will be seen that the fertilized plots on which no phosphorus was used produced growth very little better than the check plots not fertilized. Lime is also lacking, but it will be seen that the good effect of lime is not apparent until the phosphorus has been supplied. Lime of itself gave little increase over the check plots but lime with either the acid phosphate or slag very materially increased the growth. Wherever lime was used along with a fertilizer containing phosphorus the colour of the foliage was very much darker and more healthy looking than where no lime was used.

Nitrate of soda when used alone did not increase growth, but when combined with phosphorus either in the form of acid phosphate or basic slag the crop was materially increased; and when combined with acid phosphate or slag and lime the crop was

the best of any in the series in vigour and colour of foliage.

The applications were at the following rates:-

	L Outlas.
Ground limestone	2,000
Basic slag	600
Acid phosphate	450
Nitrate of soda	150
Muriate of potash	150

Tests were started at the same time with oats on a similar soil and the results were practically the same in every particular, furnishing quite conclusive evidence that phosphorus is the limiting factor in our soil fertility.

FERTILIZER Experiments with Peas.

Plot.	How Fertilized.	Pounds per acre.	Height in inches.	Weight of 100 plants.	Character of Foliage.
1. 2. 3.	Slag	600	8·5 6·5	Ounces, 7·25 6·5	Light green, no yellowing. Light green, no yellowing.
4. 5. 6.	Lime. Lime. Acid Phosphate. Nitrate of Soda. Muriate of Potash	2,000 2,000 450 150	10·0 8·5 16·5	7·75 7·0 9·75	Dark green, no yellowing. Light green, no yellowing. Light green, much yellowing.
7.	Acid Phosphate	2,000 450	11.5	8.25	Light green, some yellowing.
8. 9.	No Fertilizer	2,000	18·0 7·5	12·75 7·0	Very dark green, no yellowing. Very light green, no yellowing.
10.	Slag Nitrate of Soda Muriate of Potash Slag Nitrate of Soda Muriate of Potash	150 150 600 150	16.5	10.75	Dark green, no yellowing.
11.	Muriate of Potash Lime Slag Nitrate of Soda	2,060 600 150	18.0	12.75	Dark green, no yellowing.
12.	Slag Nitrate of Soda Lime	600 150 2,000	17.0	11.5	Dark green, no yellowing.
13. 14.	Muriate of Potash	600 150 600	19.0	11.0	Dark green, no yellowing. Light green, slight yellowing.
15.	Slag. Muriate of Potash Line. Acid Phosphate.	150 2,000 450	16.5	13.25	Dark green, no yellowing.
16.	Nitrate of Soda. Muriate of Potash. Acid Phosphate. Nitrate of Soda. Huriate of Potash.	150 150 450 150	17.5	10.5	Light green, much yellowing.
17.	Acid Phosphate	2,000 450	19.0		Dark green, slight yellowing.
18.	Nitrate of Soda Acid Phosphate Nitrate of Soda	150 450 150	17.0	9.0	Light green, much yellowing.
19.	Acid Phosphate	2,000 450 150	17.0		Dark green, slight yellowing. Light green, much yellowing.
20.	Muriate of Potash	459 150 2,900			
21. 22. 23.	Lime. No Fertilizer. Nitrate of Soda. Nitrate of Soda.	150 150	15·5 8·5 9·5	6·0 7·5	Dark green, no yellowing. Light green, no yellowing. Light green, slight yellowing.
24. 25.	Lime. Lime. Muriate of Potash.	2,000 2,000 150	11·0 8·5	6.5	Dark green, no yellowing. Dark green, no yellowing.
27.	icime. Muriate of Potash. Acid Phosphate. Nitrate of Soda.	2,000 150 450 300	9·0 7·0		Dark green, no yellowing. Light green, slight yellowing.
28.	Nitrate of Soda. Muriate of Potash. Nitrate of Soda. Muriate of Potash	300 150 150	13 - 5		Light green, much yellowing.
29.	Nitrate of Soda	150 150	9.0		Light green, much yellowing.
30.	Lime	2,000	10·5 8·0		Light green, slight yellowing. Light green, no yellowing.

EXPERIMENTAL ORCHARD WORK.

The experimental orchard work started at Berwick, Kings county, Nova Scotia; Falmouth, Hants county; and Bridgetown, Annapolis county, Nova Scotia, in 1913 was continued this year on the same orchards. Surveys made by this Station in 1912 and 1913 go to show that the greatest loss to fruit growers in Nova Scotia is due to the apple scab. This disease scems to thrive under the moist, cool climatic conditions of the province, and even where every apparent precaution is taken for the control of the disease by spraying with the usually recommended lime-sulphur, or Bordeaux mixture, the results have not been as one would expect. The orchard work therefore has been confined principally to problems associated with the application of fungicides for the control of the apple scab fungus.

The results from tests made in the various orchards go to show that thorough applications of either lime-sulphur or Bordeaux mixture applied at the proper time will practically control scab. Lime-sulphur is as good a fungicide as Bordeaux for the control of this disease. The lime-sulphur, however, is advisable after the blossoms fall owing to the Bordeaux mixture causing russeting which may materially lessen the value of the fruit. The application of a dormant strength of lime-sulphur while the trees are dormant seems to be unnecessary, and does not materially decrease the percentage of scab. The home-boiled lime-sulphur used at the same strength of diluted spray as the commercial concentrated is equally effective in the control of scab. The time of application is a factor of great importance, and in 1913 the spray put on just after the leaves had expanded was the most important. In 1914 the spray put on just before the blossoms opened was of the greatest value.

To delay the first spray until just before the blossom buds open is not safe. The pariod between the time when the leaf buds burst and the time when the blossoms open will vary according to the season. In 1913 the leaf buds expanded on Gravensteins in Berwick on April 28, and on May 17 the blossoms were beginning to unfold. In 1914 on the same variety the buds expanded May 16, and on May 28 the blossoms were beginning to unfold. It will be seen, therefore, that the time between the opening of the leaves and the opening of blossoms was one week longer in 1913 than in 1914. It would seem that much of the failure to control apple scale has been due to a too late application of the spray by not keeping the foliage well covered during the periods from the opening of the leaf buds to the opening of the blossoms. It is desirable that two applications should be given before the blossoms open in order to protect the foliage properly.

The kind of arsenate of lead is apparently a small factor in the control of scab. The different brands tested are apparently of equal value. The results from the use of lime-sulphur of different strengths would show that the strength 1.008 specific gravity, or one gallon concentrated lime-sulphur testing 1.28 specific gravity to 35 gallons of water is as effective, if thoroughly applied, as stronger solutions. Thoroughness of application is also an important factor. The top of the trees should be well sprayed. The fruit should be well covered, and this can be done only by directing the spray to all parts of the tree.

Four to six trees of a variety were included in each test here tabulated. The trees in each test were given the same tillage and fertilization. The percentage of seab and the No. 1, No. 2 and No. 3 fruit was determined by sorting, counting and weighing the fruit when harvested. Some plots where the fruit crop was too light to be fairly comparable were eliminated. The experimental orchard work was con-

ducted at Falmouth and Berwick by Mr. Arthur Kelsall, and at Bridgetown by Mr. M. P. Pike, to whom I am indebted for much of the data given above, and I wish to chank them for carrying on the work, as directed, in a satisfactory manner.

THE DORMANT SPRAY.

The claim is made that a dormant spray of lime-sulphur is necessary to effectively control apple scab. A dormant spray is one put on before the leaf bud opens. The strength usually recommended is the 1 028 specific gravity, or 1 gallon concentrated lime-sulphur to 9 gallons water. This strength of mixture will take over half as much concentrated lime-sulphur as is required to make the four necessary applications after the foliage is on the trees, and only for the fact that a tree not in foliage takes less material to spray it than is required after the foliage is on, the concentrate used for this spray would be sufficient for all the subsequent sprays. It will be seen, therefore, that if there is no gain from this dormant spray for scab control, quite a saving of concentrate and labour in application will be effected. The dormant lime-sulphur spray is necessary for San Jose scale control, but for scab control it seems unnecessary.

The application put on by some growers just after the leaf buds unfold slightly should not be considered a dormant spray, and data as to the advantage of an application stronger than the usual 1 to 35 lime-sulphur at this time is given further on under the heading "Strength of Application."

LIME-SULPHUR APPLIED AT DIFFERENT DATES.

Variety.	Dormant before , leaves opened.	Leaf buds par- tially open.	Before blossoms open.	After petals fall.	2nd spray after petals fall.	3rd spray after petals fall.	Per cent scab.	Per cent packed out, 1 and 2.	Per cent insect injury to fruit.
Gravenstein at Berwick.	April 25. 1 014 1 014 No spray 1 014 1 014 1 014 1 014 1 014 No spray	May 18. 1.008 1.008 1.008 1.008 1.008	May 28. 1.008 1.008 1.008 1.008 1.008	June 9. 1.008 1.008 1.008	June 27. 1.008 1.008	July 10.	0.76 4.3 75.44 1.12 8.5 51.79 9.51 2.28 60.98	92 59 92 01 21 06 96 99 90 82 54 54 88 89 98 31 39 06	1.52 1.45 3.97 1.88 2.13 2.62 2.42 1.50 9.38
King at Berwick	1.028 1.014 1.009	1:008 1:008 1:008 1:008 1:008 1:008	1.008 1.008 1.008 1.008 1.008 1.008 1.008 1.008 1.009 1.014 1.009	1.008 1.008 1.008 1.008 1.008 1.008 1.008 1.008 1.008 1.008	1.008 1.008 1.008 1.008 1.008 1.008 1.008 1.008	1.008	0·00 1·06 0·37 0·00 1·51 2·98 20·66 34·91 0·86 1·07 0·00 0·77 1·92	98·9 97·56 98·81 98·88 94·42 90·91 70·14 57·15 98·9 94·34 96·77 95·0 93·75	1·1 1·32 1·21 3·26 2·79 3·15 8·64 8·73 2·54 2·82 2·78 2·13 2·9
Golden Russet at Fal mouth.	April 30. 1 · 28 No spray. No spray.		May 25 1 009 1 009 1 014 1 028 1 028	June 16 1 008 1 008 1 008 1 008 1 008	July 4. 1 008 1 008 1 008 1 008		2:67 4:71 37:74 7:42 0:49 9:44 16:57 31:28	87·04 85·72 53·33 87·09 85·71 76·66 71·74 56·25	0.88 1.83 9.28 1.61 3.89 9.98 4.59 13.65
Ben Davis at Falmouth.	No spray.			1.008 1.008 1.008 1.008 1.008	1.008 1.008 1.008		0.61 1.2 30.35 0.71 0.00 0.36 36.74 2.2	88:14 86:8 57:9 90:0 89:99 90:91 51:11 85:11	1:39 2:39 11:48 0:36 1:09 4:14 10:62 4:0
Gravenstein at Falmouth.	1·28 No spray. No spray.			1.008 1.008 1.008 1.008 1.008	1.008 1.008 1.008 1.008		0·4 1·35 52·22 0·24 1·16 2·49 74·46 9·88	99·0 98·0 44·12 99·0 98·84 93·75 14·59 88·23	0.86 1.12 6.91 0.50 1.16 2.75 3.82 1.74

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LIME-SULPHUR APPLIED AT DIFFERENT DATES .- Concluded.

								4	
Variety.	Dormant before leaves opened.	Leaf buds par- tially open.	Before blossoms open.	After petals fall.	2nd spray after petals fall.	3rd spray after petals fall.	Per cent scab.	Per cent packed out, 1 and 2.	Per cent insect injury to fruit.
King at Falmouth	April 25. 1·28 No spray No spray	May 18.	May 28. 1.009 1.009 1.014 1.028 1.028 1.008	June 9. 1.008 1.008 1.008 1.008 1.008 1.008	June 27. 1.008 1.008 1.008	July 19	0.96 1.63 38.37 0.51 1.93 3.61 38.71 12.3	95°2 88°99 57°7 95°24 90°39 92°6 57°97 80°0	1.94 2.33 11.40 3.57 1.84 3.80 10.88 4.41
Gravenstein at Bridgetown.	_	May 15. 1:014 1:008 1:008 1:014	May 28. 1.008 1.008 1.008 1.008 May 24. 1.008	June 9. 1.008 1.008 1.008 1.008 1.008			3·00 6·23 3·42 8·70 57·62		
King at Bridgetown	April 24. 1.03 No spray	May 23. 1.008 1.008	May 28. 1.008 1.008	June 15. 1.008 1.008	June 25. 1.008 1.008		0·45 1·70 32·26		
Gravenstein at Ber- wick, Illsley Orch- ard.	_	May 20, 1.008 1.008	May 28. 1.008 1.008 1.008	June 10. 1.008 1.008 1.008	June 27. 1.008 1.008 1.008		6·87 4·67 2·37 24 98	90·2 91·67 90·5 71·43	2·26 2·18 1·14 8·39
Ben Davis at Berwick, Illsley Orchard.	1 · 028	1.008	1.008 1.008 1.008	1.008 1.008 1.008	1.008 1.008 1.008		0·22 1·86 1·1 3°39	90·9 89·85 92·31 85·7	0.43 0.62 0.22 2.19

Note.—Arsenate of lead at the rate of 5 pounds to 100 gallons was added to all the above sprays except the dormant ones. The "Niagara" brand concentrated lime-sulphur testing 1.28 specific gravity was used in all the experiments. Sprays of any density desired may be obtained from any concentrate by simply getting the density of the concentrate, dividing the decimal of this reading by the decimal of the spray desired and making the dilution indicated. For example, if the reading of the concentrate is 1.28, to get a spray of .028 density divide the .28 density by .028 and obtain ten. This is the total dilution required, and it is obtained by adding nine volumes of water.

1.058 1	to	10	or	1 gallon	concentrate	to 9	gallons water.
1:014-1	to	20	or	1 .,	11	19	"
1.009.1					11	30	11
1.468 1					at	0.1	11
1:007 1	to	40	or	1		39	

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TIME OF APPLICATION.

Data given below show that in 1913 the application put on just after the leaf buds had unfolded was the most important. The spring was unusually early in 1913 and all the sprays given were put on after the leaf buds had opened. The weather apparently favoured the formation and distribution of spores in the dead leaves at an early date and the spraying at that time protected the opening foliage from infection. The leaf buds were as far advanced at the Berwick orchard on the 28th April, as at the Falmouth orchard on May 9.

GRAVENSTEIN, BERWICK, 1913.

Dates o	f Spraying.		*
Before blossoms.	After blossoms.	Per cent. scab.	Per cent. Nos. 1 and 2
May 3, May 17	June 6, June 20 June 6, June 20 June 6, June 20	10·70 15·85 32·56 97·83	81·49 81·60 64·29 4·07
	GRAVENSTEIN, FALMOUTH, 1913.		
May 9 May 21	June 12, June 23, July 14. June 12, June 23. June 12, June 23. June 12, June 23, July 14 June 12, June 23, July 14	3·52 4 88· 20·54 15·85 83 63 87·35	91.68 85.65 64.93 79.39 5.13 11.25
	GOLDEN RUSSET, FALMOUTH, 1913.		
May 9, May 21 May 9 May 21 May 9	June 12, June 23	4·85 4·53 5·24 24·71 9·80 60·79	90 · 00 94 · 25 89 · 48 71 · 90 86 · 49 36 · 96
	SPY, FALMOUTH, 1913.		
May 9	June 12, June 23, July 14	2:30 65:68 62:81	83.55 25.73 34.67

The spring of 1914 was considerably later, and as a consequence the period of worst infection was later, hence the early sprays were not so necessary. The results as tabulated below would go to show that the spray put on just before the blossoms opened was of more value in controlling the apple scab. The work covering the two years would go to show that sufficient attention has not been given to the keeping of the foliage well covered with spray up to the blossoming period, and that a lot of the failure to control scab was due to this. It seems advisable, therefore, to make two applications before the blossom buds open, one just after the leaf buds are about half an inch out and another before the blossoms open. In season, like that of 1914, when the opening of the blossom buds closely follows the unfolding of the leaf buds, one spray about midway between the two may give the protection desired.

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It should be kept in mind, however, that the later sprays cannot be safely omitted, especially the spray after the petals fall. It will be noticed in the following table that in the tests with King, Greening and Spitzenburg at Falmouth, which were large trees closely planted, that the applications after the petals fell were of the greatest importance for seab control.

7							
Variety.	Dormant before leaves open.	Leaf buds partially open.	Before blossoms open.	After petals fall.		Per cent scab.	Per cent packed out 1 and 2.
King at Falmouth	No spray.	May 22.	May 30.	June 13. 1.008 1.008 1.008	July 3. 1.008 1.008 1.008	0·23 0·00 0·00 9·98	92·02 91·67 93·44 81·82
Greening at Falmouth	No spray.	1.008		1·008 1·008	1.008	0·32 2 49 56·52	91·23 89·7 40·87
Spitzenburg at Falmouth	No spray	1.003		1.008	1.008 1.008	0.55 4.21 75.5	94·59 83·33 20·21
Gravenstein at Berwick	April 25. 1:014 1:014 1:014 1:014 1:014 No spray.	May 18, 1.008 1.008 1.008 1.008	1.008 1.008 1.008 1.008	June 9.5 1 008 1 008	June 24. 1 008	4·3 1·12 8·5 51·79 9·51 2·28 60·98	92·01 96·99 90·82 54·54 88·89 98·31 39·06
King at Berwick	No spray	1.008 1.008 1.008 1.008	1.008 1.008 1.008	1·008 1·008	1.008	0.00 1.51 2.98 20.66 34.91	98:88 94:42 90:91 70:14 57:15
Ben Davis at Berwick	No spray.	May 23.	May 28.	June 15. 1.008 1.008	June 25.	1·86 1·1 3·39	
Baldwin at Bridgetown	No spray.	May 22.	May 28. 1.008 1.008	June 15. 1.008 1.008	June 24. 1.008 1.008	1:32 0:42 12:5	
Gravenstein at Bridgetown.	No spray	May 15. 1 008	May 28. 1 008 May 24. 1 008	June 9. 1.008		3·42 10 25 57·62	
						~~	

THE STRENGTH OF LIME-SULPHUR TO USE.

To determine whether there is any advantage in using a stronger lime-sulphur than the regular 1.008 mixture for the first applications a series of tests were made. This work follows up that started last year when it was found that the 1.008 mixture thoroughly applied seemed to be strong enough to give the desired protection. The results this season would go to prove that the 1.008 mixture 1 to 35 will control scab equally as well as the stronger sprays.

Variety.	Refore blossoms open.	After petals fall.	_	-	Per cent. scab.	Per cent. packed out No. 1, 2.
King at Berwick	May 28. 1.014 1.009 1.008 No spray	June 10. 1.008 1.008 1.008	June 24. 1.008 1.008 1.008	July 10. 1·008 1·008 1·008	0.00 0.00 0.86 34.91	96:77 95:00 98:9 57:15
Ben Davis at Falmouth	May 25. 1 028 1 014 1 009 No spray	June 18. 1.008 1.008 1.008	July 4. 1.008 1.008 1.008		0.00 1.71 1.2 3).74	89.99 90.0 86.8 51.11
Gravenstein at Falmouth.	1.028 1.014 1.009 No spray	1.008 1.008 1.008	1.008 1.008 1.008		1·16 0 24 1·35 74·46	98.84 99.00 98.00 14.59
King at Falmouth	1 · 028 1 · 014 1 · 009 No spray	1:008 1:008 1:008	1.008 1.008 1.008		1·93 0 51 1 63 38·71	90·39 95·24 88·99 57·97
Gravenstein at Bridgetown	May 15. 1 014 1 008 No spray	May 28. 1:008 1:038	June 9. 1:008 1:008		3·00 3·42 32·26	
Northern Spy at Berwick.	No spray	June 2. 1.009 1.008 1.007 1.014	June 23. 1.069 1.008 1.007 1.008	July 10. 1 009 1 008 1 007 1 008	0.18 0.15 0.00 0.00 73.27	92.48 94.2 95.24 93.33 20.0

Note.—Arsenate of lead 5 lbs. to 100 gallons was used in all the above sprays. The same brand of lime-sulphur was used throughout.

BORDEAUX MIXTURE versus LIME-SULPHUR.

Tests were conducted to determine the relative value of Bordeaux as compared with lime-sulphur as a fungicide for the control of seab. The results would go to show that lime-sulphur is equally as effective as Bordeaux. Notes were made on the russeting of the fruit and it will be seen that russeting followed the use of Bordeaux when applied after the blossoms fell. Sprays applied before the blossoms opened, as we would expect, caused no russeting. The russeting of fruit was not bad this season and did not so materially affect the quality of the fruit for market as was the case last season.

Tests were also made of copper sulphate solution, 1 pound copper sulphate to 15 gallons water, put on when the trees were dormant, and also the 3-3-40 Bordeaux, namely 3 pounds copper sulphate, 3 pounds lime, to make 40 gallons, applied when the trees were dormant. The results would seem to show that this dormant spray is of little value. The 4-4-40 Bordeaux was apparently as effective as the 3-3-40 Bordeaux in the control of scab.

Variety.	Dormant spray April 25.	When leaf buds were partially opened.	Before blossoms opened.	After petals fall	Second spray after petals fall.	Per cent scab.	Per cent packed out, 1 and 2.	Per cent
Gravenstein, at Berwick Chute Orghard.		May 18 4-1-40 3-3-40 4-4-40	May 28 4-1-40 3-3-40 4-4-40 3-3-40 1:008 1:008	June 9 1.008 1.008 1.008 1.008 1.008 1.008	June 24 1 008 1 008 1 008 1 008 1 008 1 008 1 008	5.64 5.51 1.8 1.21 3.4 4.3 5.52 75.44	95.45 93.83 94.28 93.1 95.38 92.1 91.3 21.06	0.00 0.00 0.00 0.00 0.00 0.00
Gravenstein, at Berwick Illsley Or- chard.		May 21 1-1-40 3-3-40 4-4-40 1:008	May 29 4-1-40 3-3-40 4-4-40 1:008	June 11 1 008 3-3-40 4-4-40	June 29 1 008 3-3-40 4-4-40 1 008	6.93 3.59 2.2 24.98 4.67	90·0 92·3 90·9 71·43 91·67	4·24 89·51 94·49 5·89 6·44
Ben Davis, at Berwick.		4-4-40 3-3-40	4-4-40 3-3-40	1 008 3-3-40	1:008 3-3-10	1.0 0.45	93 · 7 5 86 · 67	1.69
Illsley Orchard	April 25 No spray.	May 21	May 29	June 11	June 29	3·39 1·86	85·7 89·85	1·2 0·42
Gravenstein, at Fal- mouth.	No spray.		May 25 3-3-40 4-4-40 4-4-40 1:008	June 13 3-3-40 4-4-40 1:008 1:008	July 2 3-3-40 4-4-40 1:008 1:008	0.09 0.00 0.00 0.63 18.47	90·91 98·04 97·67 97·44 82·45	64·35 81·08 2·64 3·30 2·54
Spy, at Falmouth	No spray.		3-3-40 4-4-40 4-4-40 1:008	3-3-40 4-4-40 1:008 1:008	3-3-40 4-4-40 1:008 1:008	1·34 0·32 0·95 0·00 30·77	87·72 83·87 80·0 86·2 62·5	1·15 1·19 0·38 0·23 0·00

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BORDEAUX MIXTURE versus LIME-SULPHUR.—Concluded.

Variety.	Dormant spray April 25.	When leaf buds were partially opened.	Before blossoms opened.	After petals fall.	Second spray after petals fall.	Per cent scab.	Per cent packed out, 1 and 2.	Per cent
Russet, at Falmouth	No spray.		3-3-40 4-4-40 4-4-40 1:008	3-3-40 4-4-40 1:008 1:008	3-3-40 4-4-40 1:008 1:008	0·16 0·0 0·2 0·5 5·28	92·06 93·75 93·22 93·44 86·21	0.00 0.00 0.00 0.00
King, at Bridgetown	No spray.	May 20 4-4-40 1:008	May 28 4-1-40 1.008	June 10 1:008 1:008		$ \begin{array}{c c} 0.63 \\ 1.70 \\ 32.26 \end{array} $		0.00 0.00 0.00

Note.—Dormant spray 1 to 15 represents 1 gallon copper sulphate to 15 gallons of water. 3-3-40 represents Bordeaux mr/le of 3 pounds copper sulphate 3 pounds lime, and 40 gallons water. 4-4-40 represents 4 pounds copper sulphate, 4 pounds lime and 40 gallons water, 1-008 represents the regular lime-sulphur spray, 1 gallon concentrate to make 35 gallons. Arsenate of lead 5 pounds to 100 gallons was used in all the above sprays.

SACCHARATED BORDEAUX.

Representation had been made to the Department that by the addition of sugar to the regular Bordeaux mixture russeting of the fruit which usually accompanies the use of Bordeaux would not take place, accordingly a series of tests were conducted at Falmouth to determine whether such was the case.

Common brown sugar was dissolved and added to the Bordeaux mixture after it had been prepared. To one plot 6 pounds was added to 40 gallons, to another 4 pounds to 40 gallons, and to another 2 pounds to 40 gallons. The results as tabulated below show that sugar does not lessen russeting, and also that it has apparently no influence on the efficiency of Bordeaux as a fungicide.

Variety. Gravenstein at Falmouth.	Sprayed May 26. 4-4-6-40 4-4-4-40 4-4-2-40 No spray.	Sprayed June 15. 4-4-6-40 4-4-4-40 4-4-2-40 4-4-2-40	Sprayed July 4. 4-4-6-40 4-4-4-40 4-4-2-40 4-4-40	Per cent scab. 0.47 0.11 0.33 0.00 18.47	Per cent russet. 95.25 79.26 82.76 81.08 2.54	Packed out 1 & 2. 88 89 90 48 91 55 98 04 82 45
Northern Spy at Falmouth	1·008 4-4-6-40 4-4-1-40 4-4-2-40 4-4-40 No spray, 1·008	1 008 4-4-6-40 4-4-4-40 4-4-2-40 4-4-40 1 008	1·008 4-4-6-40 4-4-4-40 4-4-2-40 4-4-40 1·008	0·63 0·00 0·85 0·87 0·32 30·77 0·00	7·35 6·36 4·77 1·9 0·0 0·23	97 · 44 90 · 32 79 · 41 86 · 2 83 · 87 62 · 5 86 · 2

Note.—4-4-6-40 represents a spray containing 4 pounds lime, 4 pounds copper sulphate, 6 pounds sugar to make 40 gallons. 4-4-4-40 represents a spray containing Kentylles

4 pounds lime, 4 pounds copper sulphate, 4 pounds sugar to make 40 gallons. 4-4-2-40 represents 4 pounds lime, 4 pounds copper sulphate, 2 pounds sugar to make 40 gallons. 4-4-40 represents the regular Bordeaux, 4 pounds lime, 4 pounds copper sulphate to make 40 gallons. $1\cdot008$ represents the regular lime-sulphur spray. 1 gallon concentrate to make 35 gallons.

COMMERCIAL CONCENTRATE versus HOME MADE CONCENTRATED LIME-SULPHUR.

Tests were again conducted to determine the relative efficiency of the commercial as compared with the home made concentrated lime-sulphur. The results obtained as given in the table below would show that home made concentrated at the same density is as effective for scab control as the commercial concentrated.

Variety.	Mixture.	Before blessoms open.	ossoms After petals fall.		Per cent scab.	Per cent packed out No. 1 & 2.
Spy at Berwick	Commercial	June 2. 1.009 1.009 1.008 1.008 1.007 1.007	June 23. 1.009 1.009 1.008 1.008 1.007 1.007	July 10. 1.009 1.009 1.008 1.008 1.007 1.007	0.18 0.00 0.15 9.00 0.00 0.98 73.27	92·48 93·23 94·2 92·59 95·24 95·24 20·0
Gravenstein at Falmouth	Commercial Home-boiled No spray		June 20. 1.008 1.008	July 6. 1.008 1.008	1·35 0·77 52·22	98·09 99·0 44·12
King at Falmouth	Commercial Home-boiled No spray	1.009	1.078 1.078	1.008 1.008	1.63 1.23 38.37	88·09 93·44 57·7
Ben Davis at Falmouth	Commercial Home-boiled Vo spray	1.009 1.009	1 00 1 00	1.008 1.008	1.2 0.35 30.35	86.8 92.16 57.9
Gravenstein at Bridgetown	Commercial Home-boiled No spray	Before May 23. 1.008 1.008	Before May 28. 1.003 1.008	June 15. 1.008 1.008	June 25. 1.003 1.008	Per cent scab. 1.70 1.84 32.26

ARSENATE OF LEAD IN LIME-SULPHUR FOR CONTROL OF SCAB.

Arsenate of lead added to the lime-sulphur spray is considered to greatly increase its fungicidal value. A series of tests to get additional information as to the actual gain from its use for the control of seab was undertaken. Arsenate of lead is necessary for the control of insects and for this reason cannot be left out of our sprays. Its value as a fungicide, however, has apparently been over-estimated, and it will be noticed that to increase the amount of arsenate of lead may not necessarily increase the effectiveness of the spray. It will be noticed that dry arsenate of lead, 2 pounds to 100 gallons, was equally as effective as 5 pounds paste lead to 100 gallons.

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All plots were sprayed at the same time, May 25, June 20, and July 6, with the same strength lime-sulphur 1.009 specific gravity for the first spray and 1.008 for the next two applications. This test was conducted at Falmouth.

Arsenate of Lead to 100 gallons of Lime-sulphur.	G. Russet p. c. scab.	Ben Davis p. c. scab.	Gravenstein. p. c. scab.	Ribston p. c. scab.	King p. e. scab.
7½ lb. neutral lead. 5 lb. neutral lead. 5 lb. acid lead. 2½ lb. neutral lead. 2 lb. dry lead. Lime-sulphur only. No spray.	2.55 4.71 1.9 3.42 3.54	1·31 0·47 1·2 0·16 0·00 1·17 23·72	0·06 2·02 1·35 2·12 0·58 6·12 52·33	1.19 6.94 no fruit. no fruit. 0.51 1.09 no fruit.	no fruit. 1.63 no fruit. 0.67 1.37 31.56

FROZEN LIME-SULPHUR.

A question frequently asked is whether lime-sulphur which has been stored in outbuildings and exposed to frost during the winter is safe to use. There seems to be no good reason why it should not be all right, but in order to secure reliable data as to whether its value was lessened a series of tests was made at Falmouth. The results would go to show that a stray of the same density made from concentrated lime-sulphur exposed to frost is as effective as the spray made from a concentrate lime-sulphur not exposed to frost.

Variety.		May 25.	June 20.	July 6.	Per cent scab	Per cent packed out No. 1 and 2.
Ben Davis at Falmouth	Frozen Not Frozen No spray	1.009	1·008 1·008	1·008 1·008	1·2 1·2 30·35	89·17 86 8 57·9
	Frozen Not Frozen No Spray	1·009 1·009	1.008 1.008	1.008 1.008	0·52 1·63 38·37	90 · 88 · 09 57 · 7

HOME-MADE ARSENATE OF LEAD.

A test was made of home prepared arsenate of lead as compared with the lead paste. The same strength of lime-sulphur was used and the applications were made on the same dates in each case. The home prepared arsenate of lead was made by dissolving 22 ounces of acetate of lead (sugar of lead) and 11 ounces of arsenate of soda each in one gallon of hot water, and after being dissolved they were poured simultaneously into the diluted lime-sulphur working the agitator at the same time. The above quantity was used for 40 gallons.

	Per cent scab.	Per cent insect injury to fruit.	Per cent foliage injury from spray.
Home-made arsenate	4"6	2·32 2·18 8·39	3·0 2·6 0·0

KENTVILLE.

SOLUBLE SULPHUR COMPOUND.

Tests were made at Berwick and Falmouth with a soluble sulphur compound made by the Niagara Sprayer Company, Middleport, New York. The material used was that put out in 1913 and had directions for use on it which have since been considerably modified. The directions on the 1914 output were that three-quarters to one pound should be used to 50 gallons. Following the directions, however, on the can, 3½ pounds to 100 gallons were used for the first spray, and as the burning was very great this was dropped to 2½ pounds to 100 gallons for the second spray, and the later spray was put on with 2 pounds to 100 gallons. The latter application so far as we could determine did not cause injury to the foliage.

Sherwin and Williams arsenate of lead was used in the spray on one plot, Swift's arsenate of lead on one, and dry arsenate was also used on one in Berwick. The plots in Berwick did not produce fruit. Notes were made as to the foliage and insect injury on the plots as compared with those on which the regular spray was used. Soluble sulphur solution is apparently as adhesive as the regular spray, but is much less visible on the foliage after application. The spray was put on at Falmouth May 25, June 20, and July 6. The Berwick application was made May 21, June 1, June 12, and June 23.

Variety.	·	Per cent scab.	Per cent Codling moth injury.	Per cent other insect injury.
Gravenstein at Falmouth	Soluble sulphur S. & W. arsenate Soluble sulphur S. " Lime sulphur S. " No spray.	6·29 6·05 1·35 52·22	0·1 0·0 0·11 2·03	0.62 0.38 1.01 4.88
King at Falmouth	Soluble sulphur S. & W. arsenate Soluble sulphur S " 1. ime sulphur S " No spray.	0.22	0°42 0°43 1°4 8°38	1·9 0·87 1·63 38·37
Russet at Falmouth	Soluble sulphur S.& W. arsenate Soluble sulphur S	0.24	1·13 0·81 1·22 4·18	11·34 6·77 4·71 37 74
Fen Davis at Falmouth	Soluble sulphur S.& W. arsenate Soluble sulphur S Lime sulphur S No spray	0·00 0·00 1·03 2·69	0°35 0°99 1°36 8°79	1·21 1·27 1·2 30·35

FOLIAGE INJURY FROM SOLUBLE SULPHUR COMPOUND.

In order to get reliable information as to the exact foliage injury caused by the soluble sulphur compound as compared with lime-sulphur, a close examination was made of 500 leaves taken from each plot. The leaves selected were the older ones and ones which had evidently received all the sprays. The results given in the following table is the percentage of slight, medium, and bad injury as shown when the leaves were examined at the end of September.

It will be noticed that the Sherwin and Williams arsenate of lead which is supposed to be a lead arsenate made by the neutral process gives less injury than Swift's

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arsenate of lead which is said to be an acid process lead arsenate, and that dry arsenate of lead gave still less injury.

Variety.	<u></u>	Per cent slight injury.	Per cent medium injury.	Per cent bad injury.	Per cent total injury.
Gravenstein at Falmouth	Soluble sulphur and S.&W. arsenate " " and S. arsenate Lime-sulphur and S. arsenate No spray	42 · 0 26 · 7 11 · 0 0 0	25·2 31·7 0·0 0·0	24·7 40·0 0·0 0·0	91·9 98·4 11· 0·0
Baldwin at Berwick	Soluble sulphur and S.&W. arsenate " " and S. arsenate " " and dry arsenate Lime-sulphur and S. & W. arsenate " and S. arsenate and S. arsenate " and Grasselli arsenate No spray	51.8 38.2 50.0 1.0 1.2 0.8 1.2 0.0	17.8 25.0 15.2 0.0 0.0 0.0 0.0	9.6 29.8 10.2 0.0 0.0 0.0 0.0	79·2 93· 75·4 1·0 1·2 0·8 1·2

FOLIAGE INJURY AND RELATIVE ADHESIVENESS OF SPRAYS.

To determine the foliage injury and relative adhesiveness of different sprays a close examination was made of the foliage from plots given different amounts of arsenate of lead in the lime-sulphur as compared with plots on which no arsenate was used in the spray. The plots were all sprayed alike and at the same time. A general orchard survey of these plots revealed little difference as to injury or adhesiveness of these sprays.

The leaves selected for making observations were the older ones and ones which we considered would have received all the sprays put on during the season.

Four hundred leaves at Falmouth and 500 at Berwick, were closely examined from each plot at the end of September and the percentages of injury and percentages of adhesiveness as given on the following table represent the number of leaves showing injury or showing spray.

At Falmouth.	Per cent injury.	Per cent leaves showing spray.
L. S. and acid lead, 5 pounds to 100 gallons. L. S. and acid lead except last spray. L. S. and neutral lead, 7½ pounds per 100 gallons. L. S. and neutral lead, 5 pounds per 100 gallons. L. S. and neutral lead, 2½ pounds per 100 gallons. L. S. and neutral lead, 2½ pounds per 100 gallons. L. S. and no arsenate of lead L. S. and dry lead, 2 pounds to 100 gallons. No spray.	11·0 12·0 10·0 11·7	93·5 93·7 96·5 94·5 96·2 95·0 95·2 0·0
At Berwick.		
L. S. and acid lead, 5 pounds to 100 gallons L. S. and neutral lead, 5 pounds to 100 gallons L. S. and dry lead, 2 pounds to 100 gallons L. S. and Grasselli, 5 pounds to 100 gallons L. S. no arsenate. No spray.	1.0	52·2 -55·5 -63·2 -51·8 -52·0 -0

FOLIAGE INJURY FROM BORDEAUX-ARSENATE AND LIME SULPHUR-ARSENATE.

Notes were made of the foliage injury on the plots sprayed with Bordeaux, Saccharated Bordeaux and Lime-sulphur at Falmouth. Arsenate of lead was used in all the sprays at the rate of 5 pounds per 100 gallons. The trees were all sprayed on the same dates. The injury was not severe and consisted of black-brown spots, brown dead blotches, minute black-brown specks only visible on close inspection, and burning of the leaf edges, which was not sufficient to noticeably injure the trees. The trees had received the regular number of applications.

The leaves selected for examination were the older ones which had received all the sprays. The data given below was from 300 leaves of each plot at Falmouth and 500 from each plot at Berwick. The Bordeaux and Lime-sulphur plot was sprayed once with Bordeaux before the blossoms opened and afterwards with lime-sulphur.

Falmouth.	Per cent injury, Gravenstein.	Per cent injury, Northern Spy.	Per cent injury, Golden Russet
No spray S. Bordeaux, 4-4-6-40. S. Bordeaux, 4-4-4-10. S. Bordeaux, 4-4-2-40. Bordeaux, 3-3-40. Bordeaux, 4-4-10. Bordeaux, 4-4-10. Bordeaux, 4-4-10. Bordeaux, 4-10. Bordeaux, 4-10.	0·0 98·0 98·3 97·0 96·7 95·7 10·3 9·7	0·0 98·3 97·3 97·0 93·3 95·0 0·0	0·0 56·7 51·7 33·3 34·0 41·7 0·7
Gravenstein at Berwick.	Per cent injury.	Nature o	f injury.
Lime-sulphur, 1.008. Home-made arsenate	3.0	Burning of leaf	edge and brown
Lime-sulphur, 1.008. Swift's arsenate, 5 lbs. to 100 gallons Bordeaux, 4-4-40 before blossoms open, and lime sulphur 1.008 after petals fall. Swift's arsenate, 5 lbs. to 100	2.6	blotches.	tt .
gallons . Check, no spray .	2·6 0·0	None.	11
Bordeaux, 3-3-40. Swift's arsenate, 5 lbs. to 100 gallons Bordeaux, 4-4-40. Swift's arsenate, 5 lbs. to 100 gallons	69·2 74·8	Brown blotches: Slight defoliat	and yellow leaf. ion during fall.

Note.—The home-made lead arsenate was made by dissolving 22 ounces acetate of lead, and 11 ounces arsenate of soda each in one gallon hot water in separate buckets. These two solutions were poured simultaneously into the diluted lime-sulphur mixture to make 40 gallons.

INSECT INJURY WHERE DIFFERENT STRENGTHS OF ARSENATE OF LEAD WERE USED.

Records were made of insect injury to the fruit on the plots sprayed with different strengths of arsenate of lead. A count was made of the Codling moth injury, and also the injury from other insects. The percentage injury is given in the following table, the spraying was done May 25, June 20, July 6:—

	King.		Ben Davis.		Golden Russet.		Gravenstein.	
Arsenate of lead to 100 gallons.	Codling moth injury.	Other insect injury.	Codling moth injury.	Other insect injury.	Codling moth injury.	Other insect. injury.	Codling moth injury.	Other insect injury.
73 lb. neutral lead	no fruit. no fruit. 0 93 no fruit. 1 0 5 5 7 43 2 56	no fruit. no fruit. 1 '4 no fruit. 1 '34 3 '21 4 '95	0.00 0.16 1.03 0.32 0.16 3.93 4.18	1:31 0:98 1:36 1:29 0:63 2:95 1:91 1:89	0.96 1.32 0.61 0.25 .95 3.07 5.1 no fruit.	1.22 1.32 1.22 0.71 0.19 3.68 4.8 no fruit.	0.00 1.01 0.11 2.13 0.00 2.58 1.31	0·91 1·51 1·01 3·19 0·89 2·26 5·17

A series of tests were made at Bridgetown with lime-sulphur arsenate and lime-sulphur with the following results:—

	Insect Injury to fruit.	Per cent scab.
5 pounds S. & W. arsenate per 100 gallons 5 pounds S. arsenate per 100 gallons. Lime-sulphur only. No spray.	0·18 1·60 4·64 3·12	1·11 1·32 0·00 12·5

THOROUGH SPRAYING.

Thorough spraying counts for a lot in apple scab control. It is rather difficult to do a thorough job at the top of a 30-foot tree. The following results were obtained from a count of the fruit on a tree that had been sprayed as the operator thought thoroughly:—

Top of tree												
Five feet from	the	top	 . %	٠	 		 	 	. 5	66	66	66
At the bottom					 			 	. 2	4.6	66	66

It is interesting also to note that from records obtained we find that the larger proportion of scab on the sprayed trees is found at the calyx end of the apple. The percentage of side scab and calyx scab is about equal on unsprayed trees. This would seem to show that the spray should be directed as nearly as possible toward the calyx end of the apple.

	Per cent total scab.	Per cent calyx scab.	Per cent side scab.
Unsprayed	52 8	27 7	25

Kentuille.

THINNING FRUIT.

Experiments to determine the value of thinning the fruit were continued this season at Bridgetown. The varieties Gravenstein and Roxbury Russet (Nonpareil) were used. The set of fruit was not great and uniform trees with as heavy a set of fruit as could be secured were used. As will be seen below the set of fruit was fairly uniform at the start of the experiment.

GRAVENSTEIN.

" " " " " " " " " " " " " " " " " " "	apples picked from unthinned trees. " picked from thinned trees. " removed. " on thinned tree at start. moved. upples per barrel, tree run, from unthinned trees. " " thinned trees.		. 2,328 . 321 . 2,649 . 12.1
Per cent No. 1 fruit.		77.00	Thinned. 89.29 6.60

Taking 100 barrels tree run for comparison at the price of \$2.50 for No. 1, \$2 for No. 2, \$1 for No. 3, and 25 cents for culls per barrel, we have the following:—

	Not Thinned.	•	THINNED.						
Barrels.	Price per barrel.	Value.	Barrels.	Price per barrel.	Value.				
77.88 12.93 6.39 2.80	\$2.50 2.00 1.00 0.25	\$194·70 25·86 6·39 0·70	89·29 6·60 4·11	\$2.50 2.00 1.00	\$223 · 22 13 · 20 4 · 11				
		227 - 65			240.53				

Difference in favour of thinning 100 barrels, \$12.88.

ROXBURY RUSSET (NONPAREIL).

Average number of	of apples	picked from unthinned trees.	2,492
		picked from thinned trees	2,668
"		removedon thinned trees at start	562
Per cent of apples	remove	Γ	$\frac{3,230}{17 \cdot 4}$
Average number of	of apples	per parrel, tree run, from unthinned trees	667
		" from thinned trees	623

				Not	
~.	3.7			thinned.	Thinned.
Per cent	No. 11	ru	t	50.39	59.02
	10. 2			32.42	26.69
44	7/0.0	66	***************************************	10.15	14.29
"	Cull	6.6	***************************************	7.04	

6.39

4.11

Taking 100 barrels tree run for comparison at the prices given above we have the following:—

	Not Thinned.		THINNED.					
Barrels.	Price per barrel.	Value.	Barrels.	Price per barrel.	, Value.			
50·39 32·42 10·15 7·04	\$2 50 2 00 1 00 0 25	\$125 97 68 84 10 15 1 75	59·02 26·69 14·29	\$2 50 2 00 1 00	\$147 55 53 38 14 29			
7.04	0 25	206 71	-		21			

Difference in favour of thinning per 100 barrels, \$8.51.

It will be noticed that these trees were not uniform in set of fruit. The thinned trees after the thinning was done had 176 more apples on than the unthinned. It was thought that the set was fairly uniform. We would expect little gain from thinning in this case although it will be seen that the No. 1 fruit is increased 8.63 per cent and that the thinning has paid at the rate of 8½ cents per barrel.

The cost of thinning will vary from 10 to 25 cents per barrel according to the size of the tree. The Gravensteins in the above experiment were large, rather high trees producing about 6 barrels of fruit and cost 25 cents per tree to thin, allowing wages at 20 cents per hour, this is approximately 4 cents per barrel. The Nonpareils cost 3 cents per barrel. The cost of thinning is somewhat offset in the cost of grading which is not so great in the thinned fruit.

The thinning was done during the last week in July.

FERTILIZER EXPERIMENTS AT BERWICK.

A block of Golden Russet apples comprising 48 trees was used for this experiment. The trees are on a sandy soil which is low in fertility. This variety generally is not a heavy producer and the object is to see whether increased fertilizing will materially increase the yield. Four trees are used in a test and the area of each plot is ½5 acre.

The mixed fertilizer is made up of nitrate of soda, acid phosphate and muriate of potash. The dog fish scrap was obtained from the reduction works at Canso. It will be noticed that Plot No. 2 has the percentage of potash reduced one-half over Plot No. 1, and that Plot No. 3 has the acid phosphate and muriate of potash each reduced one-half over Plot No. 1. Plots Nos. 5, 6, 7, and 8 are similar in composition respectively to Nos. 1, 2, 3, and 4 except that the quantity per acre is increased by one-half. Plot No. 12 is the same as Plot No. 1, except that the quantity per acre is doubled.

Annual applications of fertilizer are given and a cover crop of vetch is sown early in July. The trees are 27 by 27 feet apart each way and about 15 years old.

The crop of fruit was light during 1913. There was a fair crop this season. The yields as tabulated are from the two most uniform trees in each plot.

HOW FERTILIZED.

1.	Nitrate of Soda	4	per cent.			
	Acid Phosphate	8	66			
	Muriate of Potash.	10	66	600	pounds per acr	8.
2.	Nitrate of Soda	4	66			
	Acid Phosphate.	8	"			
	Muriate of Potash	5	86	600	pounds per acre	e.
3.	Nitrate of Soda	4	44			
	Acid Phosphate	4	64			
	Muriate of Potash	5	66	600	pounds per acr	e
4.	Nitrate of Soda	2	66		2	0,
	Acid l'hosphate	8	66			
	Muriate of Potash	10	66	600	pounds per acr	e.
5.	Nitrate of Soda	4	44		P	
	Acid Phosphate	8	"			
	Muriate of Potash	10	4.6	900	pounds per acr	۵
6.	Nitrate of Soda	4	+ 6		F POX 601	01
	Acid Phosphate	8				
	Muriate of Potash	5	66	900	pounds per acre	e.
7.	Nitrate of Soda	4			produced por order	٠,
	Acid Phosphate	4	4.6			
	Muriate of Potash	5	4.6	900	pounds per acre	ρ
8.	Nitrate of Soda	2	4.6		pourus por work	
	Acid Phosphate	8	4.6			
	Muriate of Potash	10	44	900	pounds per acre	Pa .
9.	Manure				tons per acre.	٠.
	Fish				pounds per acre	۵
11.	Check			000	Trousing lies acts	
	Nitrate of Soda	4 t	per cent.			
	Acid Phosphate	8	44			
	Muriate of Potash	10	" 1.	200	pounds per acre	0

The dogfish fertilizer used in the above experiment analysed as follows:—Nitrogen 9.46 per cent; phosphoric acid, 3.16 per cent; potash, 0.93 per cent; oil, 26.69 per cent. The oil, of course, has no fertilizing value. The stable manure was fairly well rotted and apparently of average quality.

As would be expected, there is no great gain from the fertilizing in the spring of 1913, on the crop of that year. It will be noticed in 1914, however, that on the check plot the weight per 100 apples is considerably less and also where the 2-8-10 fertilizer was used there is quite a decrease in weight of 100 apples over the 4-8-10 plots. It will also be noted that the plots receiving the 600 pounds fertilizer yielded from the two trees on each plot 121 pounds less fruit than on similar plots where 900 pounds was used per acre. It would appear that nitrogen was quife a deficient element in soil of this orchard, but it is doubtful that fertilizing above 600 pounds per acre will give sufficient increased crop to pay for the additional fertilizer.

YIELD FROM TWO TREES 1913.

Plot.	No	. 1.	No	. 2.	No	. 3.	Cu	lls.	To	Average weight	
	Apples.	Weight.	Apples.	Weight.	Apples.	Weight.	Apples.	Weight.	Apples.	Weight.	per
1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11.	428 332 228 190 62 216 135 219 140 104 169 486	1b. 125 88 67 57 17 56 36 60 41 31 48 143	131 149 72 60 20 72 42 52 29 57 71 53	1b. 27 30 16 12 4 16 8 11 6 13 16 11	66 100 47 64 26 57 38 142 72 72 72 75	lb. 16 20 12 16 6 13 7 30 17 16 17 16 17	21 31 17 23 19 31 12 27 18 18 18	1b. 56 44 55 44 44 77	646 612 364 337 127 376 227 440 259 251 333 662	1b. 173 144 . 99 90 31 93 53 106 68 64 85 185	1b. 25 · 21 23 · 53 27 · 03 26 · 7 24 · 41 24 · 73 23 · 35 24 · 09 26 · 25 25 · 50 25 · 52 27 · 95

VIELD FROM TWO TREES 1914.

Plot.	No	. 1.	No	. 2.	No	. 3.	Cu	lls.	To	Average weight per	
	Apples.	Weight.	Apples.	Weight. Apple		Weight.	Apples. Weight.		Apples. Weight.		apples.
1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11.	1,191 1,110 861 779 591 1,287 1,273 1,036 1,103 969 872 1,978	1b. 350 287 236 202 166 337 320 237 309 273 216 523	157 267 166 254 96 227 277 594 168 150 719 400	lb. 31 53 33 45 17 41 49 107 31 27 80 77	67 75 55 67 25 51 83 157 65 23 115 210	1b. 12 12 9 10 5 9 15 25 11 4 17	23 33 15 28 7 50 34 136 25 12 37 63	1b. 4 6 2 4 1 6 5 17 4 2 4 8	1,438 1,485 1,097 1,128 719 1,615 1,667 1,923 1,361 1,154 1,743 2,651	1b. 397 358 280 261 189 393 386 355 306 317 646	1b. 27 · 61 24 · 11 25 · 52 23 · 14 26 · 29 24 · 33 23 · 34 20 · 07 26 · 08 26 · 52 18 · 19 24 · 37

ORCHARD FERTILIZER EXPERIMENT AT BRIDGETOWN, N.S.

A uniform block of Roxbury Russet (Nonpareil) apple trees about 30 years old was selected for this test. The trees are set diagonally 27 feet apart. The area in each plot is one quarter acre. There are eleven plots, with eight uniform Nonpareil trees in each, and each fertilized differently. The object of the test is to determine the relative value of basic slag as compared with acid phosphate for orchard work, and also to determine whether an application of lime is of any value for increasing the fruit yield. The lime used in this case, was the burnt rock lime which was put into small piles in the orchards, covered with soil and spread after it was slaked. The fertilizers were applied in 1913 and 1914.

The set of fruit on this block has been poor and not at all uniform. This is due apparently to improper pollination. The Nonpareil is apparently largely sterile to its own pollen and requires pollen from other varieties to give a satisfactory set of fruit. The Ben Davis and Baldwin are late bloomers like the Nonpareil and should

remedy this fault if planted alternately with the Nonpareil.

Nonparcil trees with Baldwin and Ben Davis in close proximity gave an average yield of four barrels fruit per tree, while trees in the same orehard and not close to another variety gave only two barrels, and the fruit somewhat inferior. Block 8 and 11 have each Ben Davis and Baldwin trees and the increased yield is no doubt due to this. Block 6, 7, 9, and 10 are practically entirely Nonpareil.

On the other hand, a block made up of Nonpareils in another part of the orchard with no other varieties adjoining and the trees planted on the square 30 by 40 feet apart, with a good circulation of air, gave an average yield of 6 barrels per tree.

The limiting factor in this orchard is evidently self sterility, due in part to the trees being of one variety and also in a measure to the trees being too closely planted, thus not permitting of a free circulation of air and sunlight conditions suitable for bees to work during the blossoming time. Should a more even crop not be produced next season it will be advisable to abandon the experiment. The results so far show very little of value. The quality of the fruit was such that no reliable deductions can be made as to the value of the different fertilizers for orchard work.

The plots were sprayed uniformly with commercial lime-sulphur and arsenate of lead. The ground was kept well cultivated. The fortilizers were applied about the

KENTVILLE.

middle of May. A cover crop of vetch was sown in the whole orchard the first week in July. The following table gives the experiment in more detail and the yield per acre during the past two years:—

FERTILIZER EXPERIMENTS AT BRIDGETOWN.

Plot.	How Fertilized.	Quantity.	Average yield per tree 1913.	Average yield per tree 1914.
No. 1	Nitrate of Soda	Lb. 160 320	Lb.	
No. 2	Muriate of Potash. Lime. Nitrate of Soda. Slag.	120 1,200 160 320	80.03	280.0
No. 3	Muriate of Potash. Lime. Nitrate of Soda. Acid Phosphate.	120 1,200 160 320	43.62	
No. 4 No. 5	Muriate of Potash Nitrate of Soda Nitrate of Soda Slag Muriate of Potash	120 160 160 320 120	56·88 61·12	295·5 227·5
No. 6 No. 7	No. Fertilizers. Nitrate of Soda. Slag.	160	200·6 74·6 140·0	336·0 126·0
No. 8 No. 9	Slag Nitrate of Soda	320 160	268.33	420.0
No. 10		120	89.09	165.4
No. 11	Acid Phosphate. Nitrate of Soda. Acid Phosphate.	320 160 320	20.44	124·4 421·0

EXPERIMENTAL STATION, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

WEATHER CONDITIONS OF 1914.

The winter was colder than the average, with spells of intense cold almost unprecedented. The average mean temperature for January, February, and March was 15.5 degrees against an average for the last forty years for these months of 18 degrees. There was, however, beginning on the 24th December, a nice even blanket of snow, and frost did not penetrate as deeply as in more open winters. The snowfall was not above the average one on the whole, and covered the ground till April 10. April was a cold and backward month with a below zero record of -3.5 degrees on the 5th, cold high winds and with a precipitation of 4.54 inches, nearly twice the average for the month. May continued cold and windy with a minimum record on the 1st of 24 degrees, and frost on the 2nd, 5th, 7th, 8th, 12th, 13th and 29th; there were some warm days, the thermometer reaching 89 degrees on the 26th. There was only onethird of the normal precipitation that month and conditions were most favourable for cultivation. Vegetation was very backward, and cold backward weather continued through June and up till the 22nd July when 44 degrees were recorded. All crops consequently made slow growth till almost August 1, and at that date such crops as corn and tomatoes were particularly unpromising. The precipitation, though not quite up to the average, was ample for the Station land and for most soils in the province, and when continued warm weather came in August and September growth was most satisfactory and crops eventually were very good. The average mean temperature for August, September and October was three degrees higher than the average temperature for the last 40 years. Harvest weather was ideal, hay and grain being housed in splendid condition, and fine weather continued into November, so that root crops as well as others were taken from the fields in the best possible condition.

The area devoted to horticulture is 17 acres, comprising the old orchard 2 acres,

new orchard 11 acres, small fruits, vegetables, and flowers 4 acres.

The trees in the old orchard show considerable improvement as a result of the care and attention given.

Nine trees of Scott Winter were top-grafted in the spring of 1913; on seven of the trees every graft took; on the remaining two 68 per cent took. The scions have

made fairly vigorous growth during the season.

A new orchard of eleven acres was set out under the direction of Mr. M. B. Davis, and 802 trees were planted, comprising 606 apples, 27 pears, 100 plums and 69 cherries. A few trees have died. In alternate rows of one block the holes for the trees were loosened with dynamite to determine what advantages, if any, may accrue from this method.

All trees were sprayed with a contact spray for aphides.

The names of varieties planted and number of trees of each are as follows:-

VARIETIES OF APPLES PLANTED IN COMMERCIAL ORCHARD.

Aloxondon		o: P	umber f Trees lanted.		of Pl	mbe r Trees
Alexander		 	15	Milwaukee		3.0
American Golden Russet	Are e	á s	15	McIntosh Red.	• •	60
Bethel			15	New Brunswick.	• •	10
Canada Baldwin			5	North Western Greening	• •	14
Crimson Beauty			21	Colones Western Greening		9
Dudley			91	Salome		5
Duchage			40	Wealthy		77
Duchess		 	30	Wolf River		15
Fameuse	٠.	 • '•	60	Yellow Bellflower		15

VARIETIES OF APPLES PLANTED IN VARIETY ORCHARD.

A		
Anson	2	Niobe 1
Anwyck	2	Nomble and C. C. C.
Black Ben Davis.	2	
Bruno.	. 2	Neville
	2	Ottawa
Bon Dorrig		Oswaid
Ben Davis.	2	Orange Crab 2
Cromer	2	Pinto.
Charlamoff	2	Pomme Royale
Cora.,	2	Petrel
Cobalt	2	Pensaukee Russett
Danville	2	Pensaukee Russett 2
Forest	2	Pike Seedling 2
Fisher Pippin		Percival
Colotto	4	Peabody Greening 2
Galetta	2	Peach. 2
General Grant (Crab apple)	2	Point Apple
Granby	2	Rufus
Gilda	2	
Herald	2	Rosalio 1
Homer	2	Rosalie,
Hyslop (Crab apple)	2	Radnor.,
Inkerman Greening.		Ripon 2
Kink ad	2	Seedling from W. Moore 1
Kinkead	2	Schoener Van Nordhausen
Kelso	2	Scarlet Pippin 2
Kildare	2	Seton 2
Langford Beauty Seedling	2	Severn
La Victoire	2	Sorel
Lowland Raspberry	2	Sorel
Lubsk Queen	2	Shiawassee Beauty 2
Linton	2	Sonora
Lawver Seedling.		Sharp Perfection 2
Tower-13	2	Summer Harvey
Lonsfield	2	Sweet Crab 2
Loka	2	Sweet Greening 2
Melvin	1	Stark
Mendel	2	
Mcdford	2	Stanley 2
Melba	2	Trenton
Munro Sweet	4	Transcendent (Crab apple) 2
7 / c == ?- F	3	Winter St. Lawrence Seedling 2
Mark 10		Walworth Pippin 2
Mark 13	2	Windsor Chief 2
Martha (Crab apple)	2	Whitney Crab 2
Montreal Beauty	2	Walden 2
McMahon White	2	
		Total
		Total 606

PEARS.

Aujou Bartlett Clapp Favourite	5	Flemish Beauty	· 5
		Trotal	

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PLUMS.

Number Number	ees of	umber f Trees lanted. 20
Dyehouse 5 English Morello 5 Early Richmond 7 Empress Eugenle 2 Fouche Morello 2 Griotte d'Osthein 2	Montmorency	5 2 2 2 7 5
Griotte Morello. 2 Hertzformige Weischel 2 Homer 2 Koslov Morello 2 Lieb 2	Osthein M. Suisse Fruche Weischel. Vladimir M. Vladimir Wragg. Total.	5 2 2 2 2 2

SMALL FRUITS.

A plantation of small fruits was started by planting 14 varieties of Black Currants, 14 varieties of Red Currants, 3 varieties of White Currants, 4 varieties of Gooseberries and 11 varieties of Raspberries.

Golden Queen Raspberry was the only one that fruited. All varieties made good growth during summer. Following is a list of varieties planted:—

BLACK CURRANTS.

Black Champion,
Boskoop Giant,
Buddenborg,
Climax,
Clipper,
Collin Prolific,
Eagle,

Eclipse.
Kerry.
Lee Prolific.
Magnus.
Saunders.
Topsy.
Victoria.

RED CURRANTS.

Admirable, Chautauqua, Cherry, Cumberland, Diploma, Fay Prolific, Greenfield, Perfection.
Rankins Red
Red Cross.
Red Dutch.
Red Grape.
Victoria Red.
Wilder.

WHITE CURRANTS.

Large White. White Cherry.

White Grape.

GOOSEBERRIES.

Crown Bob. Downing.

Pearl. Whinham Industry.

RASPBERRIES

Brighton. Marlboro.
Columbian. Older.
Count. Ruby.
Golden Queen. Sarah.
Herbert. Shaffers.
King Shaffers.

STRAWBERRIES.

Thirty-two varieties of strawberries were planted, the plants being set out in double rows and regularly cultivated. Very few survived owing to the dried out condition in which they were received from the growers, with the exception of the nine varieties of seedlings originated at the Central Farm; these came along in fairly good shape. Following is a list of the varieties planted:—

Pocomoke. Bederwood. Sample. Bisel. Senator Dunlap. Brandywine. Stevens Late Champion. Tennessee. Bubach. Chesapeake, Warfield. Clyde. Wm. Belt. Enhance. Cassandra, C.E.F. seedling. Excelsior. Cordelia Gandy. Desdemona 44 Glen Mary. Julia Haverland. Mariana 44 64 Howard. Ophelia 4.0 Portia 64 Mead. Valeria 61 44 Parson Beauty. Virgilia

GRAPES.

Twenty-five varieties of grapes were set out in the nursery and will be planted in their permanent quarters next spring. Following is a list of varieties:—

Brant.
Brighton.
Campbell Early.
Canada.
Delaware.
Early Daisy.
Eldorado.
Eumelan.
Hartford.
Lindley.
Manito.
Mary.

McTavish.

Merrimac.
Moore Diamond.
Moore Early.
Moyer.
Pattison.
Peabody.
Potter.
Rogers 36.
Vergennes.
Wilder.
Wilkins,
Winchell.

RHUBARB.

Four varieties of rhubarb were planted, viz.:-

Hobday Giant. Early Raspberry. Monarque. Prima Donna.

The plants grew vigorously and should make large clumps next year.

TREES AND SHRUBS.

The nursery stock planted in the spring of 1913 consisting of ornamental trees, conifers and shrubs did well with the exception of some of the conifers which arrived in a very dry state and subsequently died.

About 6,000 young trees, etc., were added to the nursery, and these made satisfactory growth during the summer.

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ROSES.

Fifty-three varieties of roses were grown and all did well. The following varieties were exceptionally fine, viz.:—

Dean Hole, Hybrid Tea. Colour light carmine shaded salmon; fragrant.

Etoile de France, Hybrid Tea. Velvety crimson; fine form.

Madame Abel Chatenay, Hybrid Tea. Carmine shaded salmon; fine form; free bloomer; reliable.

Madame Ravary, Hybrid Tea. Rich deep golden yellow; very beautiful in the bud.

Charles Lefebvre, Hybrid Perpetual, rich velvety crimson; fine form; fragrant. Frau Karl Druschki, Hybrid Perpetual. Pure white; vigorous grower; best white H. P.

General Jacqueminot, Hybrid Perpetual. Crimson scarlet; fragrant; one of the most reliable.

BULBS.

About 5,000 bulbs planted in the fall gave a welcome display of colour in the spring. The first to unfold their blossoms were Crocuses, *Scilla sibirica* and *Chionodoxa*. These were followed by early tulips, daffodils, late-flowering tulips, *Iris hispanica* and *Iris anglica*. It would be invidious to select any particular variety from the various groups as being the best, all being so good.

CANNAS.

A collection of cannas received from the Experimental Farm, made a fine display. Following is a list of varieties:—

Cinnabar.
Comte de Sache.
Hugues Lapaire.
King Humbert.
Mrs. Kate Gray.

Pennsylvania. Queen Charlotte. Richard Wallace. Uncle Sam.

DAHLIAS.

The dahlias were not received in time to give good results and failed to bloom.

GLADIOLI.

 Λ collection of some of the best varieties was planted and produced fine spikes of bloom. Following is a list of varieties:—

America. Glory of Holland. Halley. Hollandia. Joseph Hulot.

Niagara, Lily Lehman, Princeps, Pink Beauty, Willy Wigman,

ANNUALS.

Forty-nine varieties of annuals were sown in drills in hotbeds or in the open ground according to the requirements of the variety. The seedlings were pricked out when large enough to handle, and finally transplanted to their flowering quarters.

Eight flower beds measuring 66 feet by 6 feet were prepared and a heavy dressing of old manure thoroughly incorporated.

The plants grew exceptionally well and produced a wonderful profusion of bloom, their varied colours and graceful forms delighting the many visitors, whose expressions of admiration were very gratifying to hear.

It is a pity that these easily raised plants are not more generally grown. Following is a record of the period of bloom:—

ANNUALS SOWN IN HOTBED.

Kinds.	Sown in	Transplanted	In Bloom.	
	hotbed.	in garden.	From.	То
Asters (12 varieties) Alonsoa Antirrhinum (18 varieties) Balsam Bartonia aurea Carnation (Marguerite) Coreopsis Cosmea Draisy Dianthus chinensis Dianthus Heddewigii Dimorphotheca aurantiaca hybrids Kochia Lobelia L	" 15. " 15. " 15. " 15. " 15. " 15. " 15. " 15. " 15. " 17.	May 30. June 3. May 30. June 3. May 30. June 5. " 5. " 5. " 5. " 5. " 9. " 9. " 7. " 7. " 7. " 7. " 7. " 7. " 7. " 7	July 7.	Oct. 7. " 10. " 7. " 7. " 7. " 7. " 7. " 7. " 7. " 7

ANNUALS SOWN IN OPEN GROUND.

Sown.	In Bloom.
	From. To
Alyssum Brachycome Centranthus Chrysanthemum Clarkin elegans Eschscholtzia Godetia Larkspur G varietics) Larks	May 15. Jun 22 Oct. 7. 15. Aug. 30 " 7. 15. July 27 " 7. 15. Vag. 13 " 7. 15. Aug. 13 " 7. 15. July 7 Sept. 29. 15. " 13 " 29. 15. " 29 " 15. " 7. 15. " 18 " 7. 15. " 18 " 7. 15. " 18 " 7. 15. " 18 " 7. 15. " 18 " 7. 15. " 18 " 7. 15. " 18 " 7. 15. " 18 " 7. 15. " 18 " 7. 15. " 18 " 7. 15. " 18 " 7. 15. " 18 " 7. 15. " 18 " 7. 15. " 18 " 7. 15. " 18 " 7. 15. " 23 " 7. 16. July 23 " 7. 17. " 15. Aug. 20 Sept. 29. 18. " 26 " 29. 19. " 15 " 26 " 29. 115 " 27 " 29. 115 " 27 " 29. 115 " 3 (Jet. 7.

FLOWERS.

EVERLASTINGS.

Six varieties of everlastings were sown in flats in hotbed April 20 and transplanted to open ground June 5.

	In E	SLOOM.
Acroclinium, colours white and pink Animobium alatum, small white flowers. Helichrysum, golden yellow, pink, light purple and scarlet. Rhodanihe maculatu, white. Statice Lutfolia, seed did not germinate. Xeranthemum, double flowers, white and purple.	" 23 " 23 " 27	" 29. " 17

If gathered at the right stage and properly dried by hanging them up in small bunches in a warm airy room, these flowers will last for a long period. Acroclinium, Helichrysum and Rhodanthe are the most desirable for this purpose.

SWEET PEAS.

Fifty-four varieties of sweet peas were sown in flats on 13th April in hotbed and transplanted on 15th May into two beds, each 300 feet long by 2½ feet wide.

The plants were set out 9 inches apart in the rows; they made vigorous growth, attaining a height of over 8 feet; the blooms—mostly four on a stem—were of high quality throughout. The following varieties are especially worthy of note, viz.:—

Asta Ohn, immense blooms of beautiful lavender and mauve.

Maud Holmes, deep crimson.

Florence Nightingale, rich lavender, very large blooms.

Mrs. Routzahn Spencer, cream, tinted pink shading to apricot.

Stirling Stent, deep salmon orange, a beautiful flower.

Thomas Stevenson, brilliant orange scarlet.

Stirling Stent and Thomas Stevenson are somewhat liable to burn in full sunlight, and should be grown in partial shade for best results.

PERENNIALS.

A perennial border 600 feet long by 10 feet wide was prepared by ploughing in a heavy dressing of well rotted manure, afterwards being worked up into good condition of diseing. Several hundred perennials consisting of Anchusa italica, Aquilegia 4 varieties, Campanula 9 varieties, Coreopsis grandiflora, Delphiniums, 8 varieties Dianthus, Gaillardias, 2 varieties, Gypsophila paniculata, Heleniums, 2 varieties, Hesperis matronalis, Hibiscus, Hollyhock, Lupinus, Platycodon, Polemonium, and Pansies. Cannas, Dahlias, and Gladioli were set out at intervals along the border. Liquid manure was applied after rain whenever the opportunity occurred.

IRIS.

Twenty varieties of Iris were grown and gave a fine display of flowers of various shades. Following is a list of varieties:—

Iris florentina. "germanica Kharput. "kyb'ida Duc de Nemours. "Mrs. H. Darwin. "Verschuur. "aeglecta Agathe. "sappho. "aregata Coquette. "Darius. "aregata Concette. "aregata Coquette. "aregata Co	
" hybrida Duc de Nemours. " squalens Jacquiniana. " " Mrs. H., Darwin. " " Reine des Belg " " Verschnur. " variegata Coquete. " neglecta Agathe. " " Darius. " " Sappho. " " Graechus.	*
" Mrs. H. Darwin. " Reine des Belg " Verschnur. " variegata Coquette. " neglecta Agathe. " " Darius. " Sap)ho. " " Graechus.	
" Verschur. " variegata Coquette. " neglecta Agathe, " " Darius. " Sap)ho. " " Graechus.	
" neglecta Agathe. " " Darius. " " Sappho. " " Gracchus.	
" Sappho. " Gracchus.	
66 orientalia giagnica	
" orientalis gigantea. " " Honourable.	a.
" plicata Gazelle. " " Innocenza.	
" " Lord Seymour, " " Ossian,	

PAEONIES.

Thirty-five varieties of paeonies were planted last fall and gave a nice lot of blossoms in the spring and early summer, the rich copper foliage adding greatly to their beauty. Following is a list of varieties:—

-	2	*	
	Modele de Perfection.		Charlemagne,
66	Raphael		Feliz Crousse.
66	Marguerite Gerard.	+ 44	La Rosière.
44	Marie Crousse.	44	Avalanche.
44	Festiva Maxima.	- 44	Couronne d'Or.
6.6	Asa Gray.	6.6	Mme, de Verneville,
6.6	Thérèse.		Mlle, Rousseau,
66	Mlle, Leonie Calot,	44	Octave Demay,
66	Marie Lemoine.	41	Philomele.
4.6	Monsieur Martin Cahuzac.	44	Marie Stewart.
66	Mons. Jules Elie.	84	Mad. Emilie Galle.
66	Albert Crousse.	66	Mme. Boulanger.
44	Madame d'Hour.	и	Marquis de Ivry.
66	Grandiflora Nivea Plena.	44	Mme. Auguste Dessert.
44	Madame de Galhau.	66	Madame Geisseler.
84	Livingstone.	44	Madame Bucquet.
	La Tulipe.	+6	Volcan.
66	Duchesse de Nemours (Calot).		

VEGETABLES.

The land for vegetables was divided into plots 66 feet wide. The land had been manured in 1913 as follows: 20 tons barnyard manure and 700 pounds fertilizer containing 2.75 Nitrogen, 10.6 Phosphoric Acid and 8.3 Potash per acre. In the spring of 1914 it was divided into plots 66 feet wide. All rows were three feet apart except onions. The following tables show the results obtained, viz.:

BEANS.

Nine varieties of beans were sown on land which received manure at the rate of 30 tons per acre. They produced good crops of fine quality. There was practically no anthracense.

Variety.	Length of row.	Yield.
Valentine Wax. Wardwell Kidney Wax. Extra Early Valentine Extra Early Refugee. New White Seeded Stringless Keeney Rustless Golden Wax.	Feet. 66 66 66 66 66 66 66	Pecks. 534 552 544 442 342

BEETS.

Six varieties of beets were sown in drills on the 2nd of June on land which received rangure at the rate of 30 tons per acre. Of these, Ruby Dulcet and New Meteor were by far the best.

Following is a list of the varieties grown:

Variety.	,	Length. of Green of row. Beans. Feet. Lb.
Ruby Dulcet		66 62.5
Mew Meteor		66 . 60.7
Early Blood Red		. CC 55.0
Egyptian Dark Red Flat		66 47°3
Black Red Ball.		66 45°0
Eclipse		66 41.4

BRUSSELS SPROUTS.

Seed of one variety—Dwarf Improved—was sown in flats in hotbed on 7th April, pricked out once, and transplanted to open ground on 29th May. A fine crop of sprouts was secured.

CABBAGE.

Sixteen varieties were sown in flats in hotbed on 7th April, pricked out once, and transplanted on 29th May, each variety produced good heads of fine quality. Early Jersey Wakefield and Paris Market were the earliest, being ready for use 27th of July.

Cabbage butterflies were troublesome, but the use of hellebore kept them in check.

Following is a list of varieties grown:-

German Nofalt, Lubeck. Winnigstadt, Fottler Improved Drumhead, Extra Early Midsummer Savoy, Paris Market Very Early, Danish Summer Ballhead. Extra Amager Danish Roundhead. Erfurt Small.
Magdeburg.
Early Jersey Wakefield.
Large Late Flat Drumhead.
Fottler Improved Brunswick.
Copenhagen Market.
Flat Swedish.
Improved Amager Danish Roundhead.

CARROTS.

Three varieties of carrots were sown in drills, on land which received manure at the rate of 30 tons per acre, and thinned out as soon as large enough to handle. Improved Nantes was the best for shape and flavour, besides giving the greatest yield. Following are the results obtained:—

TT 1.4	• ,	Length Yield.
Variety.		Feet. Lb.
Improved Nantes	 	66 118.5
Chantenay	 	66 105.8
French Horn	 	66 102.9

CAULIFLOWERS.

Three varieties of cauliflowers were sown in flats in hotbed on April 7, pricked out once and transplanted to open ground 30th May. Each variety gave excellent results.

CELERY.

Seven varieties of celery were sown in flats in hotbed on April 7th, pricked out twice and transplanted to trenches on 26th June, in soil which received manure at the

rate of 30 tons per acre. All varieties did well and gave good results, particularly Improved White Plume. Following are the results obtained:—

Variety.	No. of Heads. Dozen.	Yield, Lbs.
Improved White Plume	1	20.4
Giant Pascal	1	20.0
Evans Triumph	1	16.0
White Plume	1	14.6
Noll Magnificent	1	12.2
French Success	1	10.6
Paris Golden Yellow	1	11.4

CITRON.

Five hills of citron were planted in hotbed, but failed to produce large fruit in any quantity, only one fruit weighing 10 pounds; the rest averaging 5 pounds to 6 pounds each.

CORN.

Fourteen varieties of table corn were planted on 10th June, but owing to the cold and backward season made very slow growth until the end of July.

Early Dawn, Early Iowa and Early Fordhook came into use before any of the others. Following is a list of the varieties grown:—

Black Mexican.
Country Gentleman.
Early Dawn.
Early Evergreen.
Early Fo dhook.
Early Iowa.
Farly Malcolm

Extra Early Adams.
Golden Bantam.
Malakoff.
Metropolitan.
Perkins Extra Early Market,
Pocahontas.
Stowell Evergreen.

CUCUMBERS. '

Five varieties of cucumbers were sown in strawberry boxes on 30th April and planted out on 12th June. Peerless or Improved White Spine stands out as the earliest and most prolific, Giant Pera coming second; Cool and Crisp while not giving a large yield is of excellent flavour.

EGG PLANT.

Weather conditions were unfavourable to the successful growing of egg plants, and they failed to produce any crop.

LETTUCE.

Eleven varieties of lettuce were sown in flats in hotbed on 15th April, pricked out once, and transplanted. All varieties grew well, Grand Rapids and Dreer All Heart being the best.

MUSKMELON.

Four varieties of muskmelon were grown, the only variety producing fruit of any size being Hackensack, and these were badly damaged by rats. Following is a list of varieties:—

Emerald Gem Hackensack, Paul Rose, Salzer Earliest Ripe.

ONIONS.

Seven varieties of onions were sown in drills on the 26th May, in soil which received manure at the rate of 30 tons per acre. They did not grow much until August, with the result that the bulbs did not get sufficient growth to ripen properly. Danvers Yellow Globe, Baker White Globe, and Baker Yellow Globe gave the best results in the order named. Following are the results obtained:—

	-21000	
77.	Length.	Yield.
Variety.	Feet.	Lb.
Danvers Yellow Globe	. 66	20-1
Baker White Globe. Baker Yellow Globe. Baker Red Globe		20.4
Baker Red Globe.	. 66	20.5
		18.9
		17.7
Johnson Dark Red Beauty	. 66	15.8
	. 66	7.9

PARSNIPS.

Two varieties of parsnips were sown, Improved Hollow Crown and Intermediate, the latter variety being in every way superior to the first named.

PEAS.

Fourteen varieties of peas were 60wn, on land which received manure at the rate of 30 tons per acre. A good stand of each variety was obtained with the exception of the Lincoln, which germinated badly and gave no crop at all.

The most desirable varieties are as follows, with yields in the order named, viz.: Heroine, Telephone, Gradus, Juno, Early Giant and Quite Content.

Following are the results obtained:-

Variety.	Length of row. Feet.	Yield of Green Peas in Pod. Pecks.
Heroine.	33	. 5 }
Z Circle Molito, a see a see a see a see	33	5
	33	23
Juno Early Giant	33	23 3
Early Giant. Quite Content. Dainty Duchess	33	2 3 3
Dainty Duchess. Thomas Layton	33	
Thomas Laxton	33	3
McLean Advancer	33	2 <u>3</u> 2 2 1
Premium Gem	33	∕ 2½
Stratagem	33	13
	33	14
American Wonder	33	2
Sutton Excelsior	33	11
	33	11

The above test is not conclusive owing to the ravages of blackbirds.

PEPPERS.

Four varieties of peppers were sown in paper pots in hotbed, repotted once and then transplanted to open ground on the 12th June. All varieties were satisfactory, with a preference for Long Red Cayenne.

POTATOES.

In all, ten and three-tenths acres were planted in potatoes. Most of the soils were sandy loam. An area of four and one-third acres at the foot of a hill was very wet until last season, when it was tile drained. It was planted in potatoes this season

and staked out into 53 plots of one-twentieth of an acre each. Roads sixteen feet wide were run between each range of plots and paths four feet wide between each plot. To test the relative natural fertility of each plot the whole area was planted to potatoes and a record kept of the product of each plot. As will be seen by the following tabulated statement, this unfertilized area produced a fair crop and the sample was excellent.

All portions of the crop were handled similarly. Excepting the 66 hill variety area everything was planted with a single row planter. A few Irish Cobblers were planted for table use on the 12th May. The rest of the crop was planted from the 12th to the 25th June. It was kept thoroughly cultivated before and after appearing above ground and in some places where couch grass was bad hand hocing was resorted to. Mustard was hand pulled all through the season as it appeared in the rows.

Very few Colorado beetles appeared. The first spraying was done on the 5th and 6th August. 4-5-40 Bordeaux mixture was used with which was mixed 2 pounds of Arsenoid. Spraying was again done on the 17th August, and a third spraying on the 4th and 5th September. No insecticide was used in this spraying and a fourth and

final application was given on the 14th and 15th September.

There were several stalk diseases in evidence, including Rhizoctonia, Black Leg, Stem Rot, Early Blight and Mosaic. Spraying did not keep off Early Blight as well as might have been expected, but the September application checked its spread. There also seemed to be a shiny, almost silvery affection of the leaves that has not as yet been identified. There was no Late Blight on the Station crop, though there was some elsewhere in Central New Brunswick.

So far as possible all the plants affected with the diseases mentioned above were

dug out and the tubers removed before the stalks were frosted.

The first touch of frost was noticed on the 28th September. Only a few leaves were injured. Frost on the 1st October wilted down most of the stalks and what withstood that frost were killed on the 8th October, at which date harvesting began.

A Canadian-made digger was tried out and did very satisfactory work in nearly every way; quite equal to the United States machines, and of much lighter draught.

The crop was not completely harvested until the 26th October. About half of it was sold from the field, netting approximately 30c per bushel. Small lots were sold at 40c per bushel.

The unmarketable potatoes were fed to pigs, poultry and cattle, and seed and winter supplies were stored in the various cellars on the farm.

In the seed plots each hill was dug separately, the best hills marked with a small stake and picked up separately from the smaller hills. The following is the relative yield per hill of the selected and unselected hills of the varieties named:—

Variety.	No. of large hills.	Yield.	Yield lb. per hill.	No. of small hills.	Yield.	Yield lb. per hill.	Yield per acre.
Vick Extra Early, C Houlton Rose, O Late Puritan, N Everett, N Morgan Pink Seedling, O Green Mountain, O Wee McGregor, C Irish Cobbler, O Eureka Extra Early, O	153 68 43 47 23 14 65 11	1b. 655 219 124 228 103 67 359 34 289	4·21 3·22 2·88 4·85 4·47 4·78 5·52 3·09 5·16	. 73 271 173 207 186 189 346 106 298	1b. 274 760 336 274 418 365 353 166 265	3·75 2·80 1·94 1·32 2·83 1·92 1·02 1·56 0·88	bush. 932·4 610·6 579·1 527·4 512 497·8 448·2 411 404·9

VARIETY TESTS.

One hundred and fifty-two varieties were grown in rows of 66 hills each, and the following are those which yielded at the rate of over 400 bushels per acre in 1914, and their yields in 1913 are added for comparison.

Variety.	1914 Bush. per acre.	1913 Bush. per acre.
Early Hebron, O	710.4	004
Irish Cobbler, I. H.	510.4	- 334
Money Maker, I. H.	488 - 4	413
Langworthy, O.	488 - 4	242
Dreer Standard, C.	484.0	233
Empire State T H	475.2	440
Empire State, I. H	475.2	402
Everett, N	475.2	422
Dreer Standard, I. H.	466-4	422
Empire State, O Wee McGregor, N	444.4	220
Late Puritan Br., O.	440.0	422
Everet C	435.6	367
Everett, C	431.2	409
Moore Green Mountain	431.2	380
Gold Coin, N	426.8	270
Houlton Rose, O	426.8	512
Reeves Rose, I. H	426.8	220
Rochester Rose, N	426-8	352
Rawlings Kidney, N.	422.4	349
Prince Albiert, O	418.0	308
Early Trumph	418.0	
Rural New Yorker, C.	411.6	277
Eureka Extra Early, O.	409.2	462
Rawlings Kidney, C	404.8	396
Dreer Standard, O	404.8	393
	404.8	387
Morgan Seedling, I. H.	400.4	444
Reeves Rose, N	400.4	314
Table Talk, N	400.4	545

VARIETIES of Potatoes Grown in Rows of 66 Hills each.

	I TOWN THE THE	OWS 01 00 1	IIIs each	•		
٠,		YIELD PER ACRE.				
Name of Variety.	Source of Seed.	Marketable Potatoes, 1914.	Small Potatoes, 1914.	Total Yield, 1914.	Total Yie'd, 1913.	
		Bush.	Bush.	Bush.	Bush.	
Abundance	C. E. F. Ottawa. "Nappan Indian Head Chyllettatoryn	206.8	52.8	259 · 6		
American Wonder	None	268-4	74.8	343.2	27- 45	
American Wonder	Indian Head	48.4	52.8	101.2	30.	
American Wonder	Charlottetown	281 · 6 369 · 6	30·8 30·8	312.4	293	
American Wonder. American Wonder.	C. E. F. Ottawa	250.8	57.2	400·4 308·0	310 15	
Dermuga Early	66	132.0	39.6	171.6	68	
Brydon Beauty	Charlottetown C. E. F. Ottawa	- 189-2	52.8	242.0	400	
	ec .	228·8 180·4	79·2 52·8	308.0	319	
Brydon. Buckeye State. Burpee Extra Early. Burbank Seedling. Carman No. 1. Carman No. 3. Carman No. 3. Clark No. 1.	"	66.0	17.6	233·2 83·6	378 38	
Burbank Seedling	Charlottetown	193.6	52.8	246.4	272	
Carman No. 1	nariottetown	369·6 264·0	52.8	422.4	199	
Carman No. 1	Indian Head	338.8	26·4 48·4	290·4 387·2	290	
Clark No. 1	Uttawa	316.8	26.4	343.2	325 462	
Clark No. 1	46	145.2	22.0	167.2	316	
Clyde Conquering Hero	11	$\begin{array}{c} 343 \cdot 2 \\ 277 \cdot 2 \end{array}$	35.2	378 - 4	479	
Dalmeny Beauty	«	193.6	39·6 35·2	316·8 228·8	418 356	
Dalmeny Beauty.	Indian Head	303.6	52.8	356.4	350 462	
Dalmeny Regent	" Indian Head. Ottawa.	286.0	48 - 4	334.4	435	
Dalmeny Beauty Dalmeny Beauty Dalmeny Hero. Dalmeny Regent Dalhousie Seedling	"	255 · 2 272 · 8	44·0 44·0	299 · 2	369	
Dreer Standard	" Nappan Ottawa	321.2	17.6	316·8 338·8	365 312	
Dreer Standard Dreer Standard Dreer Standard Dreer Standard Early White Priz> Early White Albino Early White Albino	Ottawa	360.8	44.0	404.8	393	
Dreer Standard	Indian Head	$\frac{422 \cdot 4}{365 \cdot 2}$	52·8 101·2	475.2	440	
Early White Priz	Nappan	352.0	35.2	466·4 387·2	442 418	
Early Market	C. E. F. Ottawa	167.2	26.4	193.6	206	
	"	264.0	48-4	312.4	356	
Early Hebron	66	237·6 457·6	$\begin{array}{c c} 17.6 \\ 52.8 \end{array}$	255.2	235	
Early Hebron Barly Rose. Early Nebraska Early Ohio Early May. Early Six weeks Early Norther Eddorado	66	110.0	17.6	510·4 127·6	299	
Early Ohio	********	321.2	13.2	334.4	415	
Early May	(6	228·8 136·4	30.8	259 · 6	338	
Carly Six weeks	"	180.4	26·4 57·2	$ \begin{array}{c c} 162 \cdot 8 \\ 237 \cdot 6 \end{array} $	277	
Sarly Norther	ndian Head. C. E. F. Ottawa.	343 · 2	39.6	382.8	347 323	
Suppire State	Charlottetown	272.8	83 - 6	356.4	338	
Empire State	ndian Hood	347·6 440·0	$26 \cdot 4$ $35 \cdot 2$	374.0	310	
Carry Norther I Caldorado Compire State Compire State I Compire State Compired Compiled C	C. E. F. Ottawa. Nappan. C. E. F. Ottawa.	400.4	44.0	475.2	402 220	
Supre State	Nappan	140.8	17.6	158.4	332	
Sureka Extra Early	E. F. Ottawa	70·4 312·4	44.0	114.4	114	
vereit	Vappan	378.4	96.8	$409 \cdot 2 \\ 475 \cdot 2$	462	
everett I	Vappan ndian Head	176.0	39.6	215.6	422 204	
	harlottetown	96-8	334.4	431.2	409	
actor	Vappan Ottawa	154·0 198·0	61.6	215.6	220	
actorI	ndian Head.	321.2	44.0	198·0 365·2	385	
annie Dean	C. E. F. Ottawa	228 · 8	39.6	268.4	224 343	
fold Coin	Vappan C. E. F. Ottawa.	382.8	44.0	426.8	270	
	'harlottetown	215·6 193·6	44.0	259 - 6	365	
old Finder	`harlottetown `.E.F.Ottawa	132.0	30·8 74·8	221·4 206·8	448 158	
reen Mountain Ir	46	184.8	30.8	215.6	420	
		215.6	66 - 0	281 - 6	308	
reen Mountain	harlottetown		44 0			
lold Finder ireen Mountain. ireen Mountain. Jr. ireen Mountain (Claret to Beat (C	harlottetown. E. F. Ottawa.	228 - 8	44.0	272.8	446	
reen Mountain (Clarel to Beat (Clarel to Beat (LI) 16—474	harlottetown. E. F. Ottawa.		44·0 30·8 70·4			

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VARIETIES of Potatoes Grown in Rows of 66 Hills Each.—Continued.

		Marketable	Small	Total	Total
Name of Variety.	Source of Seed.	Potatoes,	Potatoes.	Yield,	Yield.
142000000000000000000000000000000000000	Course of Secur	1914.	1914.	1914.	1913.
		bush.	bush.	bush.	bush.
Hard to Beat	Nappan	110.0	30.8	140.8	18
Harris Snowball	Nappan C. E. F., Ottawa Indian Head	57.2	30.8	88.0	16
Hebron Houlton Rose	C. E. F., Ottawa	154 · 0 374 · 0	17·6 52·8	171·6 426·8	21: 51:
Houlton Re o	Indian Head	281.6	26.4	308.0	13
[rish Cobbler	Nappan C. E. F., Ottawa	334 · 4 338 · 8	61.6	406·0 391·6	48
Irish Cobbler	Indian Head	422.4	52.8 66.0	488.4	44
rish Cobbler	H harlottetown	268 · 4	70.4	338 · 8	35
Late PuritanLate Puritan Br	Nappan C. E. F., Ottawa	330·0 369·6	30·8 66·0	360·8 435·6	37 36
Into Puniton	Indian Head	303-6	39.6	343.2	45
Langworthy	C. E. F., Ortawa	348·8 224·4	35.2	484.0	23
Langworthy Long Keeper Manistee	0. E. T., Ottawa	352.0	44·0 52·8	.268 · 4 404 · 8	26
McIntyre	Charlottetown	360.8	8.8	369.6	39
Morgan Seedling	Indian Hand	200.4 369.6	17·6 30·8	308·0 400·4	35 44
Morgan Seedling. Morgan Pink Seedling Morgan Seedling.	Indian HeadC. E. F., Ottawa	321.2	44.0	365.2	52
Morgan Seedling	Nappan	167.2	52.8	210.0	19
Money Maker Money Maker	Nappan. C. E. F., Ottawa. Indian Heall. C. E. F., Ottawa.	260·0 193·6	35·2 39·6	295·2 233·2	26 44
Money Maker	Indian Head	470.8	17.6	488-4	24
Money Maker Monarch New Cuardian	C. E. F., Ottawa	132 · 0 154 · 0	57·2 48·4	189·2 202·4	33 39
New Chieftoin	44	277.2	57.2	334.4	25
New Chieftain New Scotch Rose	66	255.6	30.8	286.4	63
New Queen New Queen	Indian Head	224·4 171·6	66·0 22·0	290·4 193·6	24 25
New Colonist	C. E. F., Ottawa	180-4	57.2	237 · 6	41
Norcress Pierremont Seedling	44	220·0 255·6	39·6 48·4	259 · 6 303 · 0	25
Provost	46	211.2	17.6	228.8	31 33
l'an Ametican	"	206.8	30.8	237 · 6	23
Prince Albert Puritan	Charlottetown	374·0 312·4	44·0 39·6	418·0 352·0	30 17
Queen of the Hebrons	IC E F Ottawa	96.8	8.8	105-6	8
Rawlings Kidney	Nappan Charlottetown C. E. F., Ottawa.	378 - 4	44.0	422·4 404·8	34
Rawlings Kidney Rawlings Kidney	C. E. F. Ottawa	369·6 312·4	35·2 48·4	360.8	39 36
Reeves Rose	NappanIndian Head	369.6	30.8	400.4	31
Reeves Rose Rochester Rose	Indian Head	382·8 396·0	44·0 30·8	426·8 426·8	22 35
Rochester Rose	Nappan. Indian Head	281.6	30.8	312.4	19
Rochester Rose	Charlottetown	356-4	30.8	. 387.2	30
Rose of the North	C. E. F., Ottawa	136·4 206·8	35·2 118·8	171·6 . 325·6	17 37
RoyaltvRural New Yorker	Charlottetown	382.8	30.8	411.6	27
Satisfaction	Charlottetown. C. E. F., Ottawa.	277 · 2 162 · 8	57·2 30·8	334·4 193·6	. 38
SuperlativeScottish Triumph	"	312.4	30.8	343.2	30
Scottish Triumph. Sharp Victor.		145.2	83.6	228 - 8	31
Silver King	"	290·4 224·4	44·0 52·8	$334 \cdot 4 \\ 277 \cdot 2$	42 39
St. Patrick		52.8	13.2	66.0	10
Sir Walter Raleigh		325·6 171·6	30·8 74·8	356·4 246·4	40 34
Sir John Llewellyn Table Talk	Nappan	321.2	74.8	400.4	54 54
Table Talk Table Talk	Nappan C. E. F., Ottawa	211.2	35.2	246.4	36
Table Talk Br	Indian Head	184·8 303·6	30·8 44·0	$215.6 \\ 347.6$	35 42
Table Talk Table Talk	Charlottetown	281.6	83.6	$365 \cdot 2$	44
		290.4	22.0	312.4	29
Table Talk	C. E. F., Ottawa				
Todd Wonder The Scott. The Moreton.	Charlottetown C. E. F., Ottawa	242·0 233·2	52·8 22·0	294 · 8 255 · 2	32 37

FREDERICTON.

VARIETIES of Potatoes Grown in Rows of 66 Hills Each .- Concluded.

	YIELD PER	YIELD PER ACRE.			
Name of Variety.	Source of Seed.	Marketable Potatoes, 1914.	Small Potatoes, 1914.	Total Yield, 1914.	Total Yield, 1913.
Vick Extra Early Vermont Gold Coin Vermont Gold Coin Wee McGregor Wee McGregor Wee McGregor Wee McGregor White Chief. Windsor Castle White City	Nappan. Indian Head. Charlottetown. C. E. F., Ottawa. Indian Head. Nappan. C. E. F., Ottawa. Indian Head. Charlottetown. C. E. F., Ottawa. Guisen Head. Charlottetown. C. E. F., Ottawa. Sussex. N. B. Scotch Lake, N. B.	Bush. 343·2 290·4 316·8 268·4 239·6 387·2 286·0 290·4 224·4 35·2 250·8 308·0 391·6 391·6 365·2	Bush. 30.8 44.0 17.6 30.8 22.0 52.8 39.6 52.8 57.2 70.4 44.0 52.8 39.6 52.8	Bush. 374 · 0 334 · 4 239 · 2 281 · 6 440 · 0 325 · 6 294 · 8 79 · 2 272 · 8 352 · 0 422 · 4 431 · 2 418 · 0	Bush, 531 158 477 268 393 422 479 272 446 415 182 382 176 453

Total Potato Crop.	Acres.	Bushels.	Bushels per acre.
Test for 53 fertilizer plots Commerical field (no manure or fertilizer on this land for more than 30 years). 1913 Fertilizer plots (repeated). General Fertilizer Experiments. Special Potash Experiments Seed Plots. Land not included in Fertilizer Experiments. Varieties in 66-foot rows. Early Potato patch.	1.687 1.2 1.6 0.35 1.4 0.5	555·42 352·13 156·9 440·5 92·0 400·0 124·0 208·0 50·0 2,342·95	209·6 209·6 130·7 252·8 262·8 285·7 248·0 312·0 200·0

Leaving out the experimental plots of 1913 which had no fertilizer this year, and some of which had none last, only one having complete tertilizer last season, and the early potatoes, most of which were dug before they got their growth, the average per acre for this crop was 241.3 bushels. It should also be considered that the 53 plots which were being tested for relative fertility and the land between plots, aggregating 41 acres, had no fertilizer whatever. The balance of the crop, viz., $4\frac{1}{2}$ acres, yielded at the rate of 272 bushels per acre.

RADISH.

French Breakfast was decidedly the best of the three varieties grown, being ready for use 24 days after sowing seed.

SALSIFY.

Seed of this vegetable was sown on freshly manured land, with the result that when lifted a mass of fibrous roots had formed.

SQUASH

Ten varieties of squash were grown, of which the Green Hubbard, Golden Hubbard, and Mammoth Whale were the most satisfactory. The produce of one plant of each variety was weighed, and the results will be found in the following table:—

Variety.	Produce of one average Plant.
	lb.
Long Vegetable Marrow	110.3
Mammoth Whale	95.1
Hubbard Long White Bush Golden Hubbard	58.2
Long White Bush	57.3
Golden Hubbard	49.2
Delicious.	37.0
Delicata	31.2
Custard Marrow White Bush Scalloped	28.8
Crookneck	
White Congo	Failed to set.

TOMATOES.

Twelve varieties of tomatoes were sown in flats in hotbed on April 3, pricked out into strawberry boxes on May 15, and transplanted to open ground June 15, four feet apart each way. The ground received manure at the rate of 30 tons per acre.

The land was divided into two plots 66 feet by 48 feet, and a fertilizer test carried out. Plot A was manured with barnyard manure at the rate of 30 tons per acre. Plot B was manured with barnyard manure at the rate of 15 tons per acre and fertilizer as follows: 120 pounds nitrate of soda, 480 pounds acid prosphate, 168 pounds muriate potash per acre applied.

Each variety occupied 66 feet by 4 feet in each of the test plots. In the following table will be found the results obtained:—

	T 11	YIELD.				
Variety.	Length of row. Ripe	Ripe.	Gréen.	Total.		
Sunnybrook Earliana. Rennie Extra Early Northern Adirondack Alacrity. Extremely Early Plorida Special Prosperity. Johnson Jack Rose. Trophy Chalk Early Jewel. Matchless. Livingston Globe.	66 66 66 66 66 66 66 66	lb. 87·1 71·9 30·7 49·0 52·8 13·2 32·3 27·2 17·11 9·5 14·1 11·9	1b. 48.5 66.0 53.3 31.0 42.0 43.5 24.5 11.7 49.3 22.0 22.5 11.0	1b 135.6 137.9 84.0 80.0 94.8 56.7 56.8 38.9 66.4 31.5 36.6 22.9		

FREDERICTON.

EXPERIMENTAL STATION, STE ANNE DE LA POCATIÈRE, QUE.

REPORT OF THE SUPERINTENDENT, JOS. BEGIN.

Winter was late in setting in in 1913, and very little snow fell. The temperature remained cold and the weather dry and the fruit trees wintered very well in this locality. All the snow went off at the end of March, leaving the earth hard and frozen but without any ice covering. April was cold, from beginning to end, and the earth was not entirely thawed out before the 10th of May. It was only at the end of this month that the fruit trees were in full bloom.

On the 1st of June, the flowers on the fruit trees were somewhat injured by a hard frost in some places but no damage was sustained by the orchards situated within a three-mile zone from the St. Lawrence. A fact which is worth noting is that the damages caused by the frost increased with the elevation of the orchards and their distance from the river. May and June were damp and cold, and were followed by a drought which lasted the whole of the summer.

FRUIT CROPS.

The fruit crops of all kinds, especially the European plums, which succeed very well in our district, were very promising in June. In July and August there was a very heavy drop. The crop although fairly heavy, was of inferior quality; the fruit remained small and ripened very poorly and unevenly.

The varieties of Damson plums, blue and white, the Lombard and Bradshaw, are those which seem to have suffered the most from the excessive drought of the summer. These varieties were also somewhat injured by the ripe rot or monilia. The varieties Mirabelle and Montmorency gave the best fruit of the season, but not the heaviest crop.

TREES PLANTED IN 1913-14.

Over three acres were added to the orchard this year, 486 fruit trees were planted on these three acres last spring. These trees represent the following kinds:-

Apples, 318 trees representing 22 varieties. Plum. 108 66

66 Cherry, 41 66 15 Pear. 19 66 8 22

In spite of the summer drought, these trees took root very well. They made a satisfactory growth as well as those planted in 1913-14; the growth of new wood was not very strong but this new wood ripened very well, which is still more important. Their condition in the fall was as follows:--

Apple trees, 85 per cent good, 11 per cent medium, 4 per cent dead.

Plum trees, 95 per cent good, 2 per cent medium, 3 per cent dead.

Cherry trees, all good.

Pear trees, all good.

SMALL FRUITS.

A certain number of bush fruits were planted on this Station. Owing to the lack of well-prepared soil a part of the orchard established in 1914 had to be taken for them. The bush fruits will be grown between the rows of young trees for a few years, as an intercrop.

RASPBERRY PLANTS.

One hundred and sixty-five raspberry plants, representing nine varieties of raspberries, received from the Central Farm, were planted on the 18th of May on well prepared soil. These plants, as well as the currants and gooseberries, had to be kept in nursery rows for some time and suffered a little when transplanted. Sixty-five per cent of the raspberries took well and made a satisfactory growth.

GOOSEBERRIES.

Seven varieties of gooseberries including a total of forty-two plants were planted on the 18th of May. All did well with the exception of one. The growth was very good during the summer and the new wood matured well.

CURRANTS.

Twenty-four currants representing sixteen varieties (three white and thirteen red) were planted. Two bushes died.

STRAWBERRIES.

Two hundred and ten strawberry plants, representing twenty-one varieties were planted on May 19. Ninety per cent of the plants took well and made a good growth. A small quantity of perfectly ripe fruit was harvested on six varieties.

GRAPES.

Fourteen grape vines were planted on the 18th of May, viz.: 4 Brighton, 2 Brant, 1 Canada, 2 Early Daisy, 3 Lindley, and 1 Manito. The Manito and two Lindleys died; the other plants made a satisfactory growth.

VEGETABLES.

RHIIBARB.

Twenty plants of the following varieties were planted: Early Raspherry 5, Hobday Giant 5, Monarque 5, Prima Donna 5. All these plants took well and made a good growth.

TOMATOES.

No tomato seed has yet been sown in hotbeds at this Station, but eight varieties which were sown in boxes and kept at a moderate temperature came very well. They were sown on the 20th of April and pricked out in May. Owing to the cold weather and the risks of frosts, they were transplanted only on the second of June. All the varieties made a strong growth and were left unpruned.

The first ripe fruits were picked on the following varieties: Prosperity, Sunnybrook Earliana, Sparks Earliana and Alacrity, on the following dates, respectively; 7th, 10th, 12th and 17th of September. The crop was insignificant, but these varieties are mentioned because they have proven their superiority over other varieties during the year. The average weight of the crop per plant, for all varieties, was 8\frac{3}{4} pounds of green tomatoes. The heaviest yield per plant was 15\frac{3}{4} pounds (variety, Chalk Early Jewel), and the lowest, 4 pounds (variety, Sunnybrook Earliana). These observations were taken after a frost (September 24) which injured tender plants.

STE. ANNE DE LA POCATIÈRE.

ONIONS

A row 66 feet long, of the following eight varieties was sown on the 28th of May: Danver Yellow Globe, Johnson Dark Red Beauty, Red Globe, Salzer Wethersfield Red, Long Red Wethersfield, White Globe, Yellow Globe and Rennie Extra Early.

The yield in pounds is as follows: 33, 26, 26, 37, 46, 32, 16 and 15, in the order mentioned for the varieties. The Johnson Dark Red and Red Globe are the best keeping varieties. The variety ready for the market the earliest was the Rennie Extra Early.

BEETS.

Of the six varieties of beets sown, the Cardinal Globe and Eclipse gave the highest yield. The Meteor, Red Ball and Egyptian did not give quite as heavy a yield as the preceding varieties but their beets were of better quality for table use.

CARROTS.

The Improved Nantes and Chantenay each gave a rather poor yield, but the carrots were of very good quality for table use.

CABBAGES.

Eighteen varieties of cabbage were sown in cold bads on the 24th of April and transplanted in the open on June 4th. All the varieties did well during June, but suffered heavily from the drought during the summer. The Copenhagen Market and Plat Swedish were the best of the late varieties; the Early Amager Danish and Early Paris Market the best of the early varieties.

PARSNIP.

The varieties Intermediate and Hollow Crown gave a good crop.

SALSIFY.

The variety Long White gave a good yield of the best quality.

CAULIFLOWERS.

Four varieties of cauliflower were sown on June 2nd and gave misshapen heads which did not mature. The Early Snowball and Erfurt Extra Selected gave the best results.

LETTUCE.

Ten varieties of lettuce gave a magnificent crop. The Giant Crystal Head and Improved Hanson were the first ready.

Nine varieties were sown. Their yields are given in the following table:—

Variety.	Date sown.	Quantity sown.	Length of straw.	Fit for use.	Date ripening.	Yield.
Valentine Wax. Extra Early Valentine. Bountiful. New White. Grennell Refugee or 1,000-1 Golden Wax. Extra Early Refugee. Wardwell Kidney Wax.	May 28 4 28 4 28 4 28 4 28 4 28 4 28 4 28 4	Row, feet. 60 60 60 60 60 60 60 60 60	in. 16 18 15 18 15 14 19 19	Aug. 22 " 16 " 10 " 29 " 30 " 14 " 24 " 11	Sept. 7 " 3 Aug. 26 Sept. 12 " 13 Aug. 28 Sept. 5 Aug. 27 Sept. 10	Ib. 4 1/2 4 4 1/4 1/4 2 3 1/4 1/2 2 5 1/4 1/2 6 6 6 5

STE. ANNE DE LA POCATIÈRE.

CUCUMBERS.

Three varieties of cucumbers were sown on May 28: Peerless White Spine Early Russian and Giant Pera. Sown in three hills containing three plants each, these varieties gave the following yields in the order mentioned: 32, 23 and 18 cucumbers. These vegetables were ready for use on August 17.

SWEET CORN.

Fourteen varieties of sweet corn were tried and gave the following results:-

Variety.	Sown.	One row.	Height.	Observations.
Metropolitan Early Malcolm Malakoff Black Mexican Perkins Early Fordhook Early Lowa. Golden Bantam Evergreen Pocahontas Early Dawn Country Gentleman Extra Early Adams Stowell Evergreen	May 28	ft. 60 60 60 60 60 60 60 60 60 60 60	in. 52 40 46 40 48 36 30 36 48 40 30 48 48 48	Ears short, few, not entable. Ready, Sept. 11, ears short. Ready, Sept. 8, did not ripen. Few ears, eatable Sept. 22. Keady for use Sept. 14. Ready for use Sept. 10, very good. Ready Sept. 6, ears short, very good. Fairly good, ready Sept. 8. Ears deformed and few, late. Did not suceed well this year. Good Sept. 11, fairly good, ears few. Very few ears, late. Ready for use Sept. 10. Good. Did not succeed any too well.

The varieties Early Malcolm and Malakoff gave the best yields this year. These observations were taken on the 24th of September, after a severe frost which greatly injured the crop. No variety ripened its grain for seed.

PEAS.

Fifteen varieties of garden peas were under test and some of them gave excellent results, as shown in the following table:—

° Variety.	Date sown.	Quantity sown. Row.	Date of flowering	Date of harvest.	Total crop, ripe grain.	Length of stems.
Lincoln. McLean Advancer Stratagem Gregory Surprise. Thos. Laxton. Early Giant. Dainty Duchess. American Wonder Premium Gem Heroine. Gradus. Sutton Excelsior Telephone. Juno. Quite Content	May 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	8 30 8 30	July 21 8 21 6 6 8 14 8 21 8 8 14 8 8 14 8 14	" 20 " 10 " 10 " 12 " 18 " 14 " 10 " 20 " 10 " 30	1b. 2009 3 4 20 1014 4 4 4 1014 1014 1014 1014 101	inches. 10 18 20 24 20 23 28 15 12 29 20 18 20 35

POTATOES.—Test of Varieties and Results Obtained.

Variety.	Date sown.	Quantity sown.	Date of flowering.	Date ready to use.	Date of harvesting.	Total yield.
Late Puritan. Hard to Beat Carman No. 1. Carman No. 3. Table Talk. Rawlings Kidney (Ashleaf Kidney) Rochester Rose. Irish Cobbler. Clyde. Money Maker Morgan Pink Seedling. Morgan Seedling. Warrior. Vick Extra Early Gold Coin Acquisition. Reeves Rose. Empire State Dreer Standard Factor American Wonder. Dalmeny Beauty	May 19 " 19 " 19 " 19 " 19 " 19 " 19 " 19	feet. 66 66 66 66 66 66 66 66 66 66 66 66 66	July 10 " 10 " 11 " 13 " 10 " 20 " 12 " 15 " 22 " 22 " 22 " 20 " 15 " 15 " 12 " 15 " 15 " 15 " 15 " 15 " 15 " 15 " 15	Aug. 18 " 15 " 18 " 24 " 18 " 11 " 10 " 20 " 22 " 21 " 30 " 15 " 7 " 10 " 10 " 11 " 11 " 11 " 11	Aug. 30 " 25 " 25 " 30 " 28 " 28 " 20 " 18 " 30 Sept. 2 " 5 " 2 Aug. 18 " 18 " 18 " 18 " 18 " 19 " 18	1b. 40 26 65 51 36 69 41 70 34 56 63 83 90 75 51 51 53 46 51 56 63

No traces of rot were observed on any of the tubers, and the proportion of marketable potatoes was 90 per cent for the whole. The stems remained rather short but of good colour during the whole period of growth. The yield per acre was 296 bushels 28 pounds for the whole crop.

The seed was furnished by the Fredericton Experimental Station. It was treated with a fungicide and was not attacked by any disease. Three sprayings with the following insecticide gave satisfactory results: 12 pounds arsenate of lead, and 10 ounces Paris green in 50 gallons of w. to. Sprayings were given on the 4th and 16th of July as well as on the 11th of August and helped to destroy all potato insects.

SQUASH AND PUMPKIN.

Fourteen varieties of squash and pumpkin were sown in hills and gave a good crop. The varieties Long Vegetable Marrow Hubbard and Early Sugar Pumpkin attracted special attention. These three varieties as well as the Crookneck Summer were greatly admired at the Quebec and Three Rivers fairs for their size and quality.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, GUS. LANGELIER.

CHARACTER OF THE SEASON.

The spring was about an average one for earliness, and the last frost occurred on May 17, when the thermometer went down to 29·2. As a rule, in this district, it is not safe to put out tender plants before the first week in June, as there is a liability of a frost occurring at the end of May. The main characteristic of the season was the prolonged drought which lasted all through July until August 11th. This dry weather hurt all herbaceous flowering plants, and considerably reduced the yield of vegetables, also of raspherries and strawberries. Ornamental trees and shrubs, fruit trees, currants and goseberries did not seem to be adversely affected. Though the first frost came on September 29, fifteen days later than in 1913, it found a few varieties of plums and nearly all the grapes not quite ripe.

HORTICULTURAL PLANTS AT THE STATION AND IN THE DISTRICT.

Vegetables gave about three fourths of an average crop, both at the Station and in the district; wire worms and the mid-summer drought were the causes of the decrease. The orchards at the Experimental Farm are too young to bear much yet. but all trees made a very vigorous growth and were in first-class condition in the autumn; in Central Quebec, the crop of apples and plums was very good, or about 25 per cent more than the average. Gooseberries and currants were nowhere affected by the dry weather and the yield was about as usual; strawberries and raspberries, however, suffered very much, and what, early in the season, promised to be a bumper crop, was only half of one. There are practically no pears, cherries or grapes grown in the district, but the pear and cherry trees of the Station made a fine growth, the latter producing some fruit, whilet the grapes did fairly well, though only one variety, the Wyoming Red, was early enough to ripen its fruit. Ornamental trees and shrubs did not suffer very much from the drought, but all herbaceous plants did, and the long border of perennials, at the Station, did not give half of the bloom which it did in 1913. Fungous diseases and insects did not affect fruit very much, but wire worms caused considerable damage to vegetables. Asters suffered very badly from "yellows."

HORTICULTURAL WORK AT CAP ROUGE.

The horticultural work at this Station is divided into three distinct parts: fruit, ornamental gardening, and vegetable gardening. The main lines of work with each are the testing of varieties for earliness, yield, quality, hardiness, and beauty, cultural experiments, propagation of best kinds, and the distribution of varieties found the best for the district.

FRUIT.

The fruits grown at this Station are apples, plums, cherries, pears, grapes, currants, gooseberries, raspberries and strawberries.

APPLES.

There are now 1,118 apple trees in the orchards which comprise: (1) a block of 420 Wealthy and McIntosh spaced 17½ feet in all directions with the intention of taking out the Wealthy in a few years and leaving the McIntosh 35 feet apart; (2) a block of 300 trees, twelve each of twenty-five varieties which are reasonably sure to do well in this district, and (3) a block of 194 trees, two each of ninety-seven varieties which are on trial to see which will do best here. The trees, except in the first block, are spaced either 25 by 25 or 25 by 30.

All expenses are taken account of in connection with the block of Wealthy and McIntosh, man and horse labour, value of trees, seeds for cover crops, insecticides and fungicides, etc., so that when these trees are in full bearing it can be seen

whether it pays or not to grow apples here.

The first lot of trees was planted in 1911, and out of these the following gave fruit in 1914: twelve Yellow Transparent, two Duchess, six Wealthy, three Milwaukee and one each of Okabena, Cromer, Walton, Patten Duchess, Montreal Peach, Renaud, Wolf River, McMahon White, Dyer (Pomme Royale), and Transcendent. The highest quantity from a single tree was from a Yellow Transparent, which yielded 3½ gallons of apples, or nearly half a bushel.

PLUMS.

There are 132 plum trees in the orchards, comprising 42 varieties, mostly European and American. Nearly all of them, planted in 1911, produced fruit in 1914. The finest came from Bonne Ste. Anne, Lombard and Moore Arctic, amongst the European, and from Brackett, Mankato and Sunrise, amongst the American. By far the biggest plums came from Bonne Ste. Anne. A. Wolf produced the largest quantity of fruit, which was one gallon. This is not extraordinary, of course, but there are a good many farmers who would put in trees if they knew that certain varieties produce so young, and that they can enjoy fruit from their own plantations in a very few years. The trees are planted fifteen feet in all directions.

CHERRIES.

There are fifty cherry trees representing fourteen varieties. These were planted in 1911, but were moved in 1913, which delayed them, naturally. Fruit was picked in 1914 from three Griotte d'Ostheim, three Vladimir, two Freuch Cherry, and one each of Large Montmorency, Minnesota Ostheim, Griotte Morello, and Orel. The largest yields were from Large Montmorency, Griotte Morello and French Cherry; whilst the nicest cherries were from Large Montmorency, Orel and Vladimir. The trees are spaced 15 by 15.

PEARS.

There are cleven pear trees of the following varieties: Clapp Favourite, Duchesse d'Angouleme, Flemish Beauty and Seekel. Every one of these, planted in 1911, made a vigorous growth but none produced fruit so far. The space between the trees is 25 by 30 feet.

CRAPES

Only one variety. Wyoming Red, was ripe when the first frost came, on September 29, though the following had well coloured fruit then: Brant, Canada, Campbell Early, Champion, Florence x Potter, Lindley, Manito, Peabody, Potter x Florence. Grapes were quite green at the above inentioned date on Brighton, Early Ohio, Hartford, Merrimac, Pattison, Potter, Rogers 17, Wilkins. It is probable that only two or three varieties will be of any use in this district, but the only way to be perfectly sure of this is to try all those which are most likely to succeed.

CAP ROUGE.

CURRANTS.

There are 192 bushes, comprising sixteen varieties of black, twelve of red and three of white. The average yield, in pounds, per acre, was 6,329 for the blacks, 3,863 for the reds, and 2,480 for the whites. *All these were planted in 1911 and in 1912. Amongst the blacks, the earliest was Eclipse, which had fruit ready for market on July 14, and which produced at the rate of 7,562 pounds per acre. The best yielder was Climax with 11,011 pounds per acre; one bush of this variety produced at the rate of 12,342 pounds per acre. The finest fruit came from Climax and Boskoop Giant. The earliest of the reds was Red Dutch, ready also on July 14, and giving 5,203 pounds of fruit per acre. The best yielder was Fay, with 7,744, whilst one plant of Perfection yielded at the rate of 14,151 pounds per acre. The finest fruit was from Perfection. Fay, Wilder and Red Cross. White Cherry was the éarliest amongst the whites, fruit being ready for market on July 14, the same time as for the earliest black and the earliest red. This variety yielded 2,299 pounds per acre, whilst the most productive, White Grape, gave 3,025.

GOOSEBERRIES.

Twelve varieties are on test, of the green, red, and yellow kinds. The average production was 9,222 pounds per acre, whilst the highest yielder was Silvia with 14,520 pounds. A bush of this variety produced at the rate of 18,513 pounds of fruit per acre, which is about what corn for ensilage yields in this district. The earliest was Houghton, which was ready for market on July 27, thirteen days after the first currants, and gave 6,534 pounds. The finest fruit, amongst the reds, came from Silvia, Industry, Josselyn (Red Jacket), and amongst the green, from Pearl, Mabel, Downing.

PASPBERRIES.

Besides a commercial block of half an acre of King and Herbert, there are eleven varieties on test. The average production per acre was only 1,838 pounds and the highest yielder was a purple Columbian, which gave 4,335 pounds. This variety, however, is of such poor quality that it can readily be left out. The next highest yielder was Count, with 4,033 pounds, and a plant of this variety rave fruit at the rate of 6,655 pounds per acre. The earliest ready for market was King, which produced 2,306 pounds per acre. The finest raspberries came from Herbert, King, Loudon; the fruit standing shipment best was from King, Loudon, Marlboro; and the ones which seem the most desirable for domestic use were Eaton, Herbert, King.

STRAWBERRIES.

A new strawberry plantation of about half an acre in area was started in 1914, and will come in a regular rotation of sweet corn (manured), strawberries, strawberries, strawberries, and green peas. Eighteen varieties are under test, and Excelsion proved the earliest, with fruit ready for use on June 24, and yielding 2,026 pounds per acre. The most productive was New Globe with 6,969 pounds per acre, but the fruit is not uniform enough and too light coloured for the market. Amongst the best are Uncle Jim, Schator Dunlap, Glen Mary, for main crop; also William Belt and Nettie, for late varieties.

VEGETABLES.

Two hundred and eighty-two varieties and strains of vegetables were tested in 1914, and notes kept for each as to time of sowing, germination, pricking out, transplanting, blooming, ready for use, yield, etc.

CAP ROUGE.

POTATOES.

Twenty-two varieties of potatoes were tried and the average, for the lot, was 225 bushels of marketable tubers per acre. After 1915, when most of the varieties will have been tried for five years, a good number of the low yielding kinds can be dropped. The following table gives details for 1914:—

YIELD of potatoes at Cap Rouge in 1914.

	Market-		Sm	all.	Tot	tal.		RANK.	
	a01	e. 					Market- able.	Small.	Total.
Morgan Seedling Pink Morgan Seedling Irish Cobbler Vick Extra Early American Wonder Warrior Late Puritan Rochester Rose Fable Talk Carman No. 3 Dreer Standard Money Maker Acquisition Barman No. 1 Feator Dalmeny Beauty Rawlings Kidney (Ash Leaf Kidney) Elyde Gold Coin Hard to Beat Empire State		Lb. 37 48 49 36 42 19 19 48 112 40½ 24 12 100 12 28½ 24 112 16½ 11½ 16½ 11½ 11½ 11½ 11½ 11½ 11½ 11½	Bush. 11 11 13 6 6 13 30 17 8 41 1 2 8 8 30 11 6 13 19 17 11 2	Lb. 00 00 12 366 48 48 48 48 48 48 48 48 48 48 48 48 48	Bush. 372 349 303 271 272 271 250 241 271 231 221 248 213 209 196 145 123 5, 295	Lb. 37 48 36 25 48 12 48 7 7 00 00 28\frac{1}{2} 24 48 12 00 4\frac{1}{2} 28\frac{1}{2} 28\frac{1}{2} 28\frac{1}{2} 35\frac{1}{2} 35\frac{1}{2	1 2 3 4 4 5 6 7 8 8 9 10 11 12 13 14 11 15 116 117 18 119 20 21	77 66 9 66 35 5 8 110 8 8 8 2 8 8 3 7 9 6 4 4 5 7 10	1 2 3 6 5 7 7 8 10 4 12 12 13 9 14 11 15 18 16 17 19 20 21

Besides the trial of varieties, some selection work is done, using the individual hill method. The average number of potatoes from 415 hills was 10.78, whilst it was 15-1 for the best ten, and the total weight of tubers per hill was 4.18 pounds for the 415 hills whilst it was 6.51 pounds for the best ten. The produce of each of these ten best hills will be planted separately in 1916 and a couple of the best strains kept for 1917.

BEANS.

The Lima is hardly ever grown in this district and attention should specially be paid to the "kidney" sorts. Of these, the "wax" or "butter" varieties are in most demand, but it is possible that when consumers find out the excellent quality of the green podded kinds, such as Stringless, a better market will be found for them. Thirty-one varieties and strains were tried; the heaviest yielder was from a two year Cap Rouge selection of Keeney Rustless Wax, whilst the earliest ready for market was from a Cap Rouge strain of Davis Wax. The above two varieties, with Challenge Black Wax and Wardwell Kidney Wax seem to suit our conditions yery well.

BEETS.

Table beets are generally classified according to their shape, that is, long, half long, top, oval, globe, flat globe, and turnip. The first two are often better keepers than the others and remain in good shape until late in the spring. As a rule, the nearer beets

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are to the turnip shape, the earlier they are. On our markets, here; the round ones sell best, especially if the flesh is of a rather dark colour which remains so after the vegetable is cooked. Eclipse and Meteor were the two heaviest yielders, but as the first one comes truer to type than almost any other kind, is quite early, of good quality, and of flat globe shape, it can be recommended.

CABBAGE.

The Red Cabbage is not used very much in the district, but Danish Stonehead Red can advantageously be used by persons who like this vegetable. The Savoy varieties with their delicious taste and great tenderness, are not prized as highly as they should be; Extra Early Midsummer is one of the good ones amongst the wrinkled. Of the carly varieties, Copenhagen Market continued to show its superiority over the different families of Jersey Wakefield. The heaviest yielder of all was Flat Swedish. For keeping through winter, we have found nothing yet to beat a good strain of the Danish Ballhead group. To come in between the early and late kinds, Succession is a very good one.

CARBOTS.

Carrots are hard to classify, but they can be divided into blunt rooted and pointed; of each kind, there are the short, the half long or intermediate, and the long. Generally speaking, the shorter the carrot is, the earlier, and for quality, the long ones, as a rule, cannot compete with the others, as they seem to get too coarse and fibrous. For the first part of the season, French Horn or else Oxheart would suit well, whilst for a general crop, Improved Nantes and Half Long Chantenay are good. The latter is the one which does best here.

CAULIFLOWER.

To succeed with this vegetable is hard at all times, and it seems that for this district, a very early or a late kind has to be chosen, so that either may escape the heat of middle summer, when heads are formed. Early Snowball probably makes the finest head when it is rightly grown and it seems to be the leader amongst the early kinds. We have had, however, better success with Veitch Autumn Giant and it cannot yet be said if one can be recommended to the exclusion of the other.

CELERY.

Everybody wishes to have the white sorts and the green kinds are not asked for, though, in reality, they are often of much better quality than the so-called self-blanching varieties. Paris Golden Yellow is replacing White Plume for early marketing, whilst for keeping over winter, growers seem to yet depend mostly upon the old Giant Pascal.

CORN.

Early Malcolm, which is a selection of Malakoff made at the Central Experimental Farm, Ottawa, is the best sweet corn for this district. There are varieties of better quality, such as Golden Bantam, but they are too late; there are earlier varieties, such as the common corn grown in the lower St. Lawrence but they are not table kinds. The average of four years places Early Malcolm way ahead of its nearest competitor for number of ears produced, it having beaten it by over 47 per cent.

CUCUMBERS

Of the small varieties for pickling, either Boston or Chicago Pickling is good; of the large ones, the numerous strains of Early White Spine cannot very well be surpassed. Here, as for tomatoes, there is often more difference between different strains of one variety than between different varieties.

CAP ROUGE.

LETTUCE.

The Cos varieties are hardly known in this vicinity and the curled kinds are losing ground all the time, except for forcing, when Grand Rapids easily leads them all. The market requirements call for the "head" or "cabbage" sorts, and the "butter" sub-classes are more in demand than the crisp ones. All Heart, Iceberg, and Victoria are the ones which should be recommended here.

ONIONS.

The Large Red Wethersfield is the most productive of the varieties tried here and as it is a very good keeper, under our climatic conditions, it is the one which is, to the present, most worthy of recommendation. Persons preferring a lighter coloured sort can use Yellow Globe Danvers, and for those who look for size and appearance of bulb, nothing can beat Prizetaker. In onions, one has to be very careful in using good strains, as there is often more difference between the different strains of one variety than between the varieties themselves.

PARSLEY.

A new variety, from Denmark, Dwarf Perfection, has shown such superiority over the others that it seems to be in a class by itself. It is certainly the most promising novelty tried at Cap Rouge in 1914. If it does as well in 1915, it should certainly supplant all others.

PEAS.

Fifty-two varieties and strains were tried. One of the Station selections of Sutton Excelsior was the heaviest yielder. As usual, Gregory Surprise was the earliest and as it is also very productive, it is the one which is recommended to farmers of the district. Other good kinds, in order of earliness, are Thomas Laxton, McLean Advancer, and Stratagem.

RADISHES.

The two varieties which were the highest yielders were from seed grown at this Station: Turnip Early Scarlet White Tipped and White Icicle. The first produced a little more and is better liked on the market on account of its fine colour. The latter, however, can remain longer in the ground without getting woody. The well known, much-heralded as to quality, French Breakfast, does not seem to do very well or to be in demand in this district.

SQUASH.

The Long Vegetable Marrow was easily the heaviest yielder and is also a good seller. The Crooknecks, though really of better quality, are not liked because there is too much waste in peeling. For persons with limited areas at their disposal, nothing can be better than the Long White Bush Marrow, as it grows upright instead of trailing around in all directions.

TOMATOES.

A new variety, Danish Export, was three days earlier than anything else in 1914, and it gave the smoothest, though the smallest, fruit. The heaviest yielder of total ripe fruit was Prosperity which held the same distinction in 1913. It is, however, about ten days later than the different strains of Earliana, and an unusually short season might make a big difference. Alacrity, which is a selection of Earliana made at the Central Experimental Farm, Ottawa, is, to the present, the one which can be recommended for central Quebec, because it gives a rather large percentage of ripe fruit at an early date.

TURNIPS.

Consumers of this district do not like the white turnips, but rather prefer the purple tops. Of the first, Extra Early White Milan was the heaviest yielder. The Purple Top Milan, though producing less, was sold much more easily.

OTHER VEGETABLES.

Besides the above, the following were grown and can be recommended for central Quebee: Brussels sprouts, Dwarf Improved; Parsnip, Hollow Crown; Salsify, Long White; Spinach, Victoria.

ORNAMENTAL GARDENING.

The drought of the early part of summer was not conducive to the best development of the new lawns, but they pulled through with the increased precipitation of September and October. The same thing applies to the ornamental trees and shrubs. Amongst these, some that did well are Forsythia intermedia, Neillia opulifolia aurea, Philadelphus grandiflorus, Amorpha fruticosa, Spiraea arguta, Spiraea bracteata. Spiraea japonica (callosa), Spiraea salicifolia, Spiraea Van Houttei. The last named was fairly covered with bloom and admired by all visitors. All the Syringas, especially the ones planted in 1913, did well and made a fine, strong growth. The Loniceras were very pretty, whilst Hydrangea paniculata grandiflora did not do very much, probably on account of the dry weather. Of the conifers, none did very well, but Larix europaea, Juniperus communis fastigiata, the Piceas, and the Thuyas are looking fairly good. Amongst the hedges, Berberis Thunbergii has done better this year than before, and so did Picea pungens whose fine blue colour is very much admired. The one most liked by visitors is Thuya occidentalis, but it is probable that when they are all well grown, Juniperus communis fastigiata will be found the prettiest. Cornus alba sibirica is a strong grower but not prized as much as the evergreens. The roses were much admired and the flowering season was lengthened by many of the varieties blooming for a second time in the autumn. On the perennial border, drought kept things back, but amongst the plants which did the best were the Oriental Poppy, the Aquilegias, Lupinus, Hesperis matronalis, the Campanulas and the Delphiniums. Hollyhocks bloomed profusely, but the dry weather caused the flowers to droop very soon. Annuals were shorter and the blooms not quite so good as in 1913, on account of lack of rain.

Notes had to be taken on about 1,401 varieties of ornamental plants: 269 annuals, 478 perennials, and 654 ornamental trees and shrubs.

CULTURAL EXPERIMENTS IN ORCHARDS.

The general practice, in the orchards, is to leave on each side of the rows of trees a space of four feet, which is cultivated until about July 1, and then sown to a cover crop. This is to encourage as much growth as possible early in the season, and stop as much as possible all growth in the latter part of summer, so that the wood may have time to mature before the heavy frosts of winter. Between these spaces, a three year rotation of roots, oats and clover has been started. As the trees grow, the cultivated strips on each side will be wider and the space devoted to the rotation narrower.

To find out the effect on the growth of trees, on their yield, and on their condition, an experiment has been started, to compare clover, rape and vetches, as a cover crop, and also with rape followed by clover, and lastly with permanent sod. In the latter case, the hay is cut and left on the ground for a certain part, whilst for the other it is cut and taken away. As this experiment is in a commercial orchard of 420 trees, all McIntosh, with Wealthy as fillers, and the ground is fairly uniform, it will be interesting to note results, the more so because notes are kept for each individual tree.

CAP ROUGE.

CULTURAL EXPERIMENTS WITH VEGETABLES.

Cultural experiments are being started with the principal kinds of vegetables. With beans and peas, there will be a comparison of relative advantages of a succession of varieties of different seasons with the same variety planted at intervals of a week apart for four weeks; with cabbage and cauliflower, different devices, such as felt paper discs and cheap cheese cloth individual covers will be tried to protect the plants from root maggots; with beets, carrots and parsnips, thinning at different distances will be tried; with celery, different methods of blanching will be compared; with onions, seed sown in the open and thinned at different distances will be in competition with plants started early inside, and with onion sets, whilst these will be grown from different varieties, and lastly, there will be a test of various methods to control maggots; with tomatoes, tying to stakes and to wires, pruning to one and two stems, transplanting once or twice, ripening fruit in various ways when there is danger of frost, will be very interesting experiments; with rhubarb, seed will be sown each year for three seasons to find out how long it takes to grow plants large enough to cut, also to force, and different ways of forcing in the cellar will be tried; with potatoes, buds taken from different parts of the tubers will be compared, also whole small potatoes with sets cut from medium to large ones cut to 1, 2, 3 and more eyes; then the number of cultivations, the level or ridges system, the distance apart of rows and sets in the rows, the cost of growing half an acre or more, sprouted vs. unsprouted, mulching to obtain stronger seed, sets cut and coated at once with gypsum or land plaster as against not coated, planting at different dates, are many experiments which will be valuable when results of a few years are available.

IMPROVEMENTS OF VARIETIES AND PROPAGATION OF BEST.

In fruit, seedlings are grown of the varieties of apples, plums, cherries, goose-berries, currants, raspberries and strawberries which have shown themselves ahead of the others for yield or earliness. For apples, roots are grown at the Station, and for grafting, scions are used from trees whose records are the best. The same thing is done in propagating gooseberries, currants and strawberries; all of these, which are grown here, come from individual plants of more than ordinary merit. It is possible that the road to extraordinary success, even with these methods, is a long and tortuous one, but it will certainly be very interesting to note results.

With vegetables, selection only has been resorted to, but it is intended to make a few crosses in 1915. In this connection it is well to say that seed has been grown of the following kinds in this northern latitude: beans, corn, cucumber, lettuce, muskmelon, peas, pepper, pumpkin, radish, squash, tomato, turnip, watermelon. Besides this, beets, carrots, onions, parsnips have been kept over successfully, in the

ground, and will produce seed in 1915.

The good results obtained to date with home-grown seed would tend to show that farmers and truckers would find it profitable to produce seed of at least a few of the different kinds of vegetables which they grow.

DISTRIBUTION.

Young apple trees, gooseberries, currants, raspberries, strawberries, ornamental plants, flower seed, sweet corn, garden peas, and tomato seed were distributed in the spring of 1915. This was commenced in 1912, at the request of a few farmers who desired to have varieties adapted to the climate and conditions of this district, and though it was never advertised in the papers, nor any means taken to increase the number of applicants, these are getting so numerous that there can be no doubt of the popularity of the distribution. It will either have to be limited or the office force

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increased, as the correspondence occasioned by it is getting quite heavy. With each lot sent out is a letter advising the person who receives the goods that questions on an enclosed circular must be answered if the name is to remain on the lists for further distributions. At the same time a bulletin or a circular letter giving instructions as to the best methods to use for the seed, or plants, or trees forwarded is sent, so that the distribution is certainly of great educational value. Not only this, but from the reports received from these men, who become interested co-operators, much information is gathered which is of benefit to the Station. In 1916, it is the intention, with the card record system covering this part of the work, to refuse seed or plants to persons who have already had the same thing, and to encourage them to grow seed and propagate plants themselves.

EXHIBITIONS.

Horticultural products from Cap Rouge were exhibited at the three largest shows of the province of Quebec: Three Rivers, Quebec, and Sherbrooke. Fruit, vegetables and flowers were on display, and it can be said that this was very attractive. The educational side was never forgotten, tomatoes, for instance, being placed near each other. Some of these were perfectly ripe, whilst other varieties, sown at the same time, were green. One or two men, perfectly competent to give visitors all reasonable information asked for, were in attendance all the time, and blank forms were on hand for people who wished to get any publication issued by the Experimental Farm system. In the province of Quebec, exhibitions are visited by a great number of farmers who probably would never care to come to an Experimental Farm. It has been remarked that quite a few of these, interested in the various displays, ask questions and talk quite a bit with the men in charge. From this, good results are sure to come, as these farmers get in closer touch with the Experimental Farm system and quite often afterwards come and visit the Station.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

REPORT OF THE SUPERINTENDENT, J. A. McCLARY.

The Lennoxville Experimental Station for the Eastern Townships is situated in the valley of the St. Francis river, in the southeastern part of the province of Quebec, 25 miles from the boundary line of Vermont state, and was only started in the spring of 1914; therefore there is very little to report on, but it is hoped to have things well under way for the continuance and progress of this branch of the work another year.

One of the first things done at the opening of this Station was the planting of a nursery of ornamental trees and shrubs for future use, which have done very well through the summer, and after this winter it will be possible to report on their hardiness at least as small plants. Also there have been set out twenty-six varieties of strawberries which will be ready for permanent planting in the spring.

VEGETABLES.

TOMATOES.

One-half acre of land was used for tomato plants of different strains which had been bred on the Central Experimental Farm, and the plants sent to us. We found Alacrity crossed with Ponderosa a very prolific variety, with Alacrity crossed with Dwarf Stone not far behind, being a very abundant bearer and fruits almost free from cracks.

CORN.

Fifty-four different varieties of sweet corn were planted on June 5. The season was not very good for corn, so most of these varieties did not mature sufficiently for use. We found Early Dawn to be the earliest and of very good quality, Early Malcolm next, and Malakoff not far behind.

POTATOES.

There were planted for hill selection six different varieties of potatoes, namely: Carman No. 1, Empire State, Early Ohio, Green Mountain, Irish Cobbler and Gold Coin, of which a hill selection was made for planting next spring. In these varieties, 100 hills were selected of each with which were compared 100 hills as they came in the rows. It was found that they varied from 66 to 181 pounds. The potatoes from the selected hills weighed 181 pounds and from the unselected 66 pounds. We hope with this hill selection to be able to raise seed for distribution in a year or two which will be of great benefit to the farmers in this district.

FLOWERS.

Several varieties of perennial flower seeds were planted on July 16, which came on very well. They have been transplanted into beds, and we are very pleased to say that many of them were in bloom when winter set in. A collection of tulips, narcissus, and hyacinths was planted this autumn, from which there should be a good show next spring.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

The season of 1914 opened with favourable conditions for horticulture, but the fair promises of spring were not fulfilled by the months of summer. From June 1 until September the rainfall was very light and mostly in scattered showers that did no good. Combined with dry weather were excessive heat and hot winds. As a result, horticulture did not fare very well. Persistent cultivation insured a reasonably good crop of vegetables. Tomatoes in particular having been given plenty of room, thrived in the heat. But potatoes, fruits, lawns and flowers, did very poorly. In September and October there were some showers which revived the grass and helped any crops that were late enough to be benefited.

FRUIT.

CRAB APPLES.

A large crop of crab apples was harvested from many of the hybrid trees originated by the late Dr. William Saunders, formerly Director of Experimental Farms. These trees were produced by crossing standard apples with *Pyrus baccata*, a wild Siberian apple of great hardiness but bearing very small astringent fruit. The resulting hybrids are the hardiest crab apples for use in Western Canada, and though not suitable for eating raw, they make very good preserves or jelly. Some of the best are, Silvia, Elsa, Robin, Tony, Norman and Charles.

A large number of seedlings from these hybrids have been tested. Most of them are of no value, but a few trees prove valuable. Two in particular, both seedlings of Cluster, are the most productive trees in the orchard and bear fruit of fair size and good quality.

STANDARD APPLES.

Not much success can be reported with the larger types of apples. The location is a hard one and none of the trees tried as yet are entirely satisfactory. Some fruit was produced this year as is the case practically every year, but as yet no standard apple tree has borne regularly and productively on this farm.

In order to develop a hardier type of standard apple, if such is possible, a large number of seedlings are being grown. About ten thousand seedlings of the hardiest varieties, varying in age from one to three years, are now being produced on this Farm. It is hoped that this large number will give sufficient variation so that it will be possible to select a type of sufficient hardiness to stand our climate and yet bear fruit of reasonable size and quality.

PLUMS.

The plum crop was not as large as usual, being lowered somewhat by the heat and drought. Nevertheless, a very satisfactory yield was obtained. The best strains of native plum are the most desirable under test. One of these, known as Major, is the earliest in the orchard and produces fruit of good flavour and medium size. The Chency variety is quite hardy and of good quality, but a little late for this climate. The Aitkin is also quite hardy, but is flat and insipid in flavour. A number of the

new varieties produced by Prof. Hansen of South Dakota are being tested, but the results are not very satisfactory as yet. The trees seem scarcely hardy enough for this climate.

CURRANTS.

The following varieties of red currant were set out in a new plantation in 1913: Wilder, Red Cross, Red Grape, Red Dutch, Cherry, Greenfield Red, Victoria Red, Cumberland Red, Pomona, Rankin Red, Raby Castle, Perfection. All have grown well and wintered well. Red Cross gave the best yield in 1914.

The following varieties of black currant were set out at the same time: Topsy, Eagle, Success, Climax, Collins Prolific, Victoria, Eclipse, Saunders, Clipper, Buddenborg, Kerry, Magnus. All grew well and wintered well. The best yield in 1914 was produced by Buddenborg.

Three varieties of white currants were set out at the same time: White Grape, White Cherry, and Large White. All three have done well. Large White produced slightly more than either of the other two.

GOOSEBERRIES.

Eighteen plants each of the Houghton and Downing gooseberries were set out in 1913. Houghton wintered well and produced 27 pounds of fruit in 1914. Downing was badly injured during the winter and produced practically no fruit.

RASPBERRIES.

Nine varieties of raspberries were planted out in 1913. The following were more or less winter-killed and produced little or no fruit in 1914: Turner, Loudon, King and Ironclad. The best producer in 1914 was the Caroline, a yellow raspberry of small size, medium flavour and rather poor appearance. The second best was Sunbeam, a small red raspberry of rather poor flavour; the third was Herbert, a fine, large, handsome berry of first-class flavour. Miller also produced well and the fruit was of good size and flavour.

We do not consider this test as decisive, as some of the varieties that have failed to produce this year have been considered among the best. The results of the years that follow may make a difference.

STRAWBERRIES.

A new strawberry plantation was set out this year and no results are obtainable as yet. The varieties that have given best results in previous years are: Pocomoke, Senator Dunlap, and Bederwood.

VEGETABLES.

POTATOES.

The usual tests of varieties of potatoes were conducted again this year. Four 68-foot rows were grown of each variety. The season was very unfavourable and potatoes were from a half-crop to a failure all over Manitoba. The results for 1914 and the average for the past five years are as follows:—

GROWN FOR 5 YEARS OR MORE.

	CIROWN	TOR O IE.		TE.				
Variety.	Form.	Colour.	Size.	Time of Maturity.	YILD PER ACRE.			
variety.	rorm.	Colour. Size.		Maturity.	1914.		5-year average.	
Empire State Rawlings Kidney Woodbury White Rose American Wonder Manitoba Wonder Reeves Rose Early Ohio Late Puritan Morgan Seedling Irish Cobbler Pescock Surprise Early White Prize Hamilton Early Gold Coin.	Long. Long. Long. Round. Long. Long. Round. Long. Round. Long. Round. Long. Round.	White White White Red Pink Pink White Light pink White Russet White White	Large Medium Large Medium Medium Large Large Large Large Large Medium Small Large Large	Medium Late Medium Late Medium Medium Early Medium Early Early Late Late Medium Late	Bush. 234 237 260 261 267 214 275 186 166 202 176 218 217 258	1b. 40 25 5 15 40 30 00 5 50 35 00 10 16 30	Bush. 513 487 468 448 444 443 440 435 429 421 407 406 396 360	1b. 40 23 9 37 24 14 14 39 00 16 33 52
GROWN FOR 4 YEARS ONLY.								
		White Pink			181 209	30 55	581 435	11 39
Wee McGregor	Oval	White	Large	Late	238	40	479 3	0
	GROWN	FOR 2 YEAR	RS ONLY.					
Early Norther. Houlton Rose. New Queen Early Hebron.	Long Oval	Pink Pink Pink Pink	Large Medium	Early	278 259 242 234	50 25 55 40	398 372 361 354	45 45 37 45
Grown for 1 Year Only.								
Early Snowdrop Ashleaf Kidney (English type) Snider Best Early	Long	White	Small	Early	282 220 196 166	20 00 44 50	,	
For main eran variaties	Empiro	State P	amlings	Kidney	Woo 7	1.C)

For main crop varieties, Empire State, Rawlings Kidney, Wee McGregor, and Table Talk are recommended. Table Talk gave exceptionally high yields in 1911, 1912 and 1913, but this year it suffered very severely in the dry weather and was one of the lowest in yield. This was true in a lesser degree of all late varieties. The early varieties were better developed at the time of the drought and consequently suffered less severely. Among the best early varieties are Early Ohio, Early Bovee and Early White Prize.

COOKING TEST.

A cooking test of the varieties of potatoes was made this year. The notes taken are presented in tabular form as follows:—

Remarks,	Cooks very slowly. Cooks quickly. Cooks sldwly. Very white flesh. Cooks very quickly. Cooks very slowly. Very white flesh.
Dryness.	Dry. Medium. Dry. Medium. Medium. Dry. Dry. Dry. Dry. Dry. Dry. Dry. Dry
Texture.	Fine Medium Medium Medium Medium Medium Fine Medium Fine Medium Fine Medium Fine Fine Fine Medium Fine Medium Fine Medium Medium Fine Medium Medium Medium Medium Fine Fine Fine Fine Fine Medium Fine Medium Fine Fine Fine Fine Fine Fine Medium Medium
Flavour,	Very good Very good Very good Good Good Good Very good Cood Good Good Good Good Good Good G
Character of Surface.	Smooth, medium shallow eyes. Smooth, medium shallow eyes. Fairly smooth, fairly shallow eyes. Fairly smooth, fairly shallow eyes. Rather rough, medium deep eyes. Fairly smooth, fairly shallow eyes. Fairly smooth, fairly shallow eyes. Smooth, shallow eyes. Very deep eyes. Very deep eyes. Very smooth, very shallow eyes. Smooth, fairly shallow eyes. Smooth, rather deep eyes. Smooth, rather deep eyes. Smooth, shallow eyes. Smooth, shallow eyes. Smooth, shallow eyes. Smooth, fairly shallow eyes. Sanoth, fairly shallow eyes. Fairly smooth, fairly shallow eyes. Sanoth, fairly shallow eyes. Sanoth, fairly shallow eyes. Fairly smooth, fairly shallow eyes. Sanoth, medium shallow eyes.
Variety.	Empire State Rawlings Kidney Woodbury White Rose American Wonder Manitobia Wonder Retwee Rose Farly Ohio Late Puritian Morgan Seedling Frish Cobbler Franck Surprise Early White Frize Gold Coin Table Talk Barly Bovee Wee McGregor Wee McGregor Wee McGregor Wee McGregor Wee McGregor Wow McGregor

FERTILIZER TEST WITH POTATOES.

In order to test whether it would be profitable to use commercial fertilizers on good Manitoba soil, a fertilizer test has been carried on for three years. Summer-fallow land has been used each year. The quantities of fertilizers used would cost about \$9 or \$10 per acre for each single kind and three times that amount for the complete fertilizer. The results obtained were as follows:—

Fertilizer Used.		POTATOES ACRE.
Ferenizer Used.	1914.	Average of three years.
No Fertilizer Muriate of Potash (320 pounds per acre). Acid Phosphate (600 lb. per acre). Sulphate of Ammonia (160 pounds per acre). Complete Fertilizer— Muriate of Potash (320 pounds per acre). Acid Phosphate (600 pounds per acre). Sulphate of Ammonia (160 pounds per acre).	Bush. lb. 245 40 247 30 229 10 220 00 252 25	Bush. lb. 372 10 394 10 337 10 337 57 431 8

It will be observed that the increased yield is hardly sufficient to justify the cost of fertilizer.

DISTRIBUTION.

A distribution of 397 samples of seed potatoes was made in the spring of 1914.

ASPARAGUS.

A bed of asparagus that has been in use for a considerable number of years again produced a crop of very acceptable early vegetable. It was ready for use on May 6. This vegetable is well worth more general use. It requires very little attention, and coming into use so early, is a real treat.

BEANS.

Ten varieties of beans for use as string beans were tested this year. Very little difference in earliness was observed, as the heat brought them all on together. Wardwell Kidney Wax is a yellow variety of good quality, among the earliest, and is therefore recommended.

BEETS.

Ten varieties of beets were tested this year. Among the best for table quality are Black Red Ball and Ruby Dulcet. Extra Early Turnip also gave good results.

CABBAGE.

Twenty varieties of cabbage were tested this year. Results were very unsatisfactory as nearly all the heads split open when the rains came in September after the drought. Early Paris Market is recommended for early use. Copenhagen Market is probably the best all-round cabbage considering quality, yield and earliness.

CAULIFLOWER.

Extra Selected Early Erfurt gave best results this year, being ready for use on July 18th, and producing 14 pounds 9½ ounces from ten average heads. Early Snowball is also a good reliable variety.

CARROTS.

Four varieties of carrots were tested; Half Long Chantenay and Improved Nantes are the best.

CELERY.

Celery was a failure this year. No water was used on any crop in the vegetable garden, and celery showed itself to be the only crop that was unable to get along without artificial watering in a dry year. White Plume is the finest quality of the varieties under test here and is recommended for home use on that account.

CITRONS.

Red-Seeded, Colorado Preserving and Graham's were tried. Little difference was observed as to their desirability; all did well. Graham's produced 145 pounds of fruit from 12 plants.

CORN.

Thirteen varieties of table corn were tried this year. As is the case every season, excellent results were obtained. The corn was planted on May 16th in rows 3 feet apart with the hills 3 feet apart in the rows.

Variety.	Ready for use.	Table Quality.	Hei	ight.	Yield of Number of Ears.	Weight of Ears.
Squaw Improved Squaw. Early Malcolm. Early Malakoff. Extra Early Adams. Northern Success. Early Dawn. Early Dawn. Fordhook Early Pocahontas. Perkins Early Market. Henderson Metropolitan Golden Bantam.	Aug. 5 " 10 " 10 " 10 " 11 " 11 " 17 " 17 " 18 " 18	Fairly tender, fair flavour. Fairly tender, fair flavour. Tender, good flavour. Tender, fairly good flavour. Tender, fairly good flavour. Tender, fairly good flavour. Tender, fairly good flavour. Fairly good. Very tender, good flavour. Very tender, very good flavour. Tender, good flavour. Very tender, very good flavour.	4 5 4	in. 8 0 6 2 4 9 0 6 0 10 0 3	33 36 32 54 25 49 54 45 42 33 38 47	1b. 14 16 12½ 11 9 14 13 16½ 13 15½ 15 12

It is advisable to use three varieties in a Manitoba garden. A few hills of Squaw corn will ripen very early in the season. The Squaw corn seems very good at this time when the better varieties are not available. Then, a few hills of Malakoff or Extra Early Adams will follow after the Squaw. Then, the bulk of the plot should be Golden Bantam; once this variety is tasted none of the others satisfies.

CUCUMBERS.

Six varieties of cucumbers were tested this year. One, Giant Pera, did not germinate. McKenzie Prolific gave the largest yield and was also the first to be ready for use.

LETTUCE.

Fourteen varieties of lettuce were tested this year. They were all sown April 23. The results were as follows:—

Variety.	Ready for use.	Length of Season.	Table Quality.	of Ave	ight one rage int.
Red Edged Victoria Rousseau Blond Winter Unrivalled Summer. All Heart. All-the-Year-Round Butter- head. Denver Market. Black-Seeded Simpson Grand Rapids Giant Crystal Head Hanson Improved. Dark Green Capucine Iceberg. Cos Trianon. Favourite.	" 23 " 26 " 30	3 4 18 10 15 8 12 14 14 6 11 7	Medium flavour and texture Medium, tough leathery texture. Medium in flavour and texture. Medium in flavour, and texture. Very good flavour, crisp and tender. Good flavour, crisp and tender. Very good flavour, very crisp. Good flavour, fairly crisp. Medium flavour, medium texture Very good flavour, very crisp and tender. Fairly good flavour, crisp and fairly tender Very good flavour, crisp and fairly tender. Very good flavour, very crisp and tender. Heart sweet and tender, but outside rather tough Very good flavour, extra crisp and tender.	0	oz. 3 3 10 3 1 2 12 10 1 14 10 4 6 14

Rousseau Blond Winter and Red Edged Victoria are supposed to have some merit on account of earliness, but they are very unsatisfactory, as their season is short and their quality poor. Among the best are Iceberg, All Heart, Favourite, Giant Crystal Head and Denver Market.

MELONS.

One variety of musk melon or cantaloupe and one of water melon were grown this year; both produced ripe fruit.

ONIONS.

Sixteen varieties of onions were tested this year. The following results were obtained:—

Variety.	Colour.	Shape.	Uniformity	' Size.	Yield from 30-foot row.
	Red. Red. Red. White. Yellow Red. White. Red. Brown Red. White. White. White.	Globular Flat Flat Globular Globular. Flat Globular. Flat Globular. Globular. Globular. Globular. Globular. Flat Flat Flat Flat	Good. Good. Good. Good. Good. (Not true Good. Good. Medium. Poor. (Not true	Medium Medium Small. Small. to type.)	Lb. 33 30 29½ 29½ 27½ 26½ 26 25 24½ 21 21 21 21 21 21 21 21 21 21 21 21 21

PARSNIPS.

Two varieties of parsnips were grown this year: Improved Hollow Crown and Intermediate. Best results were obtained from the Hollow Crown; the Intermediate, which gave such desirable short roots last year was not true to type this year and produced ordinary long roots.

PEAS.

Twenty varieties of garden peas were tested out this year. The results were as follows:—

Variety.	Ready for Use.	Length of Vine.	Length of Pod.	Average No. of Peas in Pod.	Table Quality.	from	eld on 30 ot w.
Early Pilot Gregory Surprise Thos. Laxton American Wonder Gradus Premium Gem Early Giant Sutton Excelsior McLean Advancer Western Beauty Rivenhall Wonder Dainty Duchess Rent Payer Stratagem Heroine	" 30 July 3	Inches. 24 18 86 27 42 21 48 29 27 38 26 60 32 30 36	Inches. 3 3 3 2 2 2 4 3 4 3 3 3 3 3 3 4 4 4	6758586686877	Very good Very good Good Good Good Very good Very Good Very Good Very Good Very good Exoellent Very good Very good Very good Very good Very good Very good	1b. 2 3 3 2 3 3 3 4 5 3 3 3	OZ. 0 0 0 0 0 0 0 0 0 0 0 8 0 0 8 0 0 8
Telephone. Juno. Quite Content Late Giant.	" 17 " 17 " 20 " 21	57 32 72 40	$\begin{array}{c} 4\frac{1}{2} \\ 3 \\ 4\frac{1}{2} \\ 4\frac{1}{2} \end{array}$	9 8	Excellent. Very good. Fair. Very good.	3 3 4 6	0 0 0. 8

Early Pilot was the earliest pea under test, with Gregory Surprise second. Late Giant and Rent Payer gave the greatest yield and were very good in quality at the same time. Others of outstanding quality and good yield are: Dainty Duchess, Telephone, Sutton Excelsior and Stratagem.

RADISH.

Four varieties of radish were grown. They were all ready for use on June 6, and little difference in quality could be observed.

SALSIFY.

One variety of spinach, Improved Thick-leaved, was grown; it was ready for use on June 10th.

SQUASH, MARROW, PUMPKIN.

Seven varieties of squash, four of marrows and three of pumpkins were sown. Germination was poor and the results consequently unreliable. The Hubbard is decidedly the best squash or marrow, on account of its fine flavour and good keeping quality. Some fine specimens of pumpkins were produced this year.

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POMATORS

Nine varieties of tomatoes were grown this year. The season was unusually favourable for the production of ripe tomatoes, and very good results were obtained. The seed was sown in the hotbed on April 4, the plants were set out on June 9. The results were as follows:—

Variety.	Ready	YIELD E	ROM FIVE	Plants.	
	for Use.	Ripe.	Green.	Total.	
Alacrity Ño. 14. Rennie XXX Chalk Early Jewel. Extremely Early IXL.	July 30	Lb. oz. 29 13 27 6 23 7 21 15 21 13 20 3 18 3 16 14 16 10	Lb. oz. 15 0 8 0 11 0 16 0 16 14 15 8 13 8 20 0 21 0	Lb. oz. 44 13 35 6 34 7 37 15 38 11 31 11 36 14 37 10	

Although Florida Special has done best this year it is not recommended, as its success was due to the excessive heat. In normal or cool seasons, best results can be obtained from the various strains of Earliana.

TURNIPS.

Two varieties of white turnips and one of swede were tested this year. The white turnips are not worth growing in Manitoba as they are scarcely ever fit to eat. The swedes did quite well considering the season.

ORNAMENTAL PLANTS.

TREES AND SHRUBS.

No additions have been made to the arboretum this year, but the usual notes have been taken on the growth, hardiness, date of blooming, etc. Trees and shrubs bore the drought well, looked well all the season, and those that bloom were not deterred from making their usual display. Last year's report contained a description of the best shrubs and hedges for Manitoba use, which need not be repeated here.

ROSES.

The rose bed was well protected during the winter, by means of a covering of straw and earth. The bloom was fairly good considering the unfavourable season. Some of the most satisfactory varieties in use are: Paul Neyron, Magna Charta, Frau Karl Druschki, Mrs. Anthony Waterer.

HERBACEOUS PERENNIALS.

The hardy perennial is the most reliable and satisfactory plant for the growing of flowers around the Western farm home. Once established it produces flowers year

after year with very little trouble or care. This year the perennials stood the drought much better than the annuals and gave a succession of bloom from the last of May until the freeze up.

A new perennial border was set out last year. Most of the plants wintered satisfactorily and some bloom was produced this year. The old perennial beds made a fine show of bloom all season. Some of the best perennials for Manitoba use are: Siberian Iris, German Iris, Columbine, Paeony, Bleeding Heart, Sweet William, Perennial Phlox, Larkspur, Bellilower, Chinese Bellflower, Golden Glow, Orange Globe Flower, Giant Autumn Daisy.

BULBS.

Daffodils, hyacinths, freesias and tulips were used for house bloom in the winter. They were potted in the fall and provided a supply of beautiful flowers from Christmas until spring.

A large number of tulips were used for early spring bloom in the garden and made a splendid display. Some of the best varieties of tulips are: Red, Proserpine, Vermilion Brilliant, Imperator Rubrorum and Artus; White, Joost von Vondel and La Reine; Yellow, Couronne d'Or and Chrysolora; red and yellow, Keizerskroon and Duchesse de Parma. These are all perfectly hardy and well suited to the climate. No other bulb but the tulip is sufficiently hardy for satisfactory outdoor wintering for early spring bloom.

Gladioli and dahlias were planted in the spring for summer bloom, but did not do well this year. In normal seasons an excellent display can be obtained from these and

in favourable seasons from cannas as well.

ANNUALS.

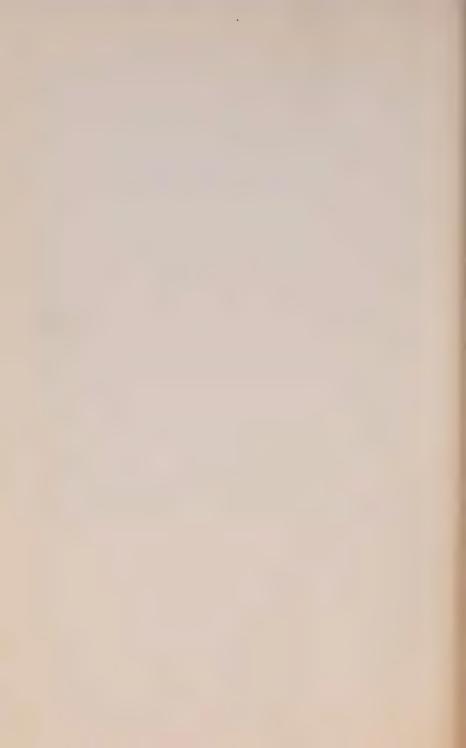
The season has been the most unfavourable for annual flowers for many years. Continuous hot dry weather combined with a lack of water for artificial watering made it very difficult to keep up any appearance of bloom. Two hundred and three varieties and types of annual flowers were tested. All plants started in the hotbed were set out in permanent location about the first week of June. Some of the notes taken are as follows:—

			,	
, Kind.	Where Sown.	Date Sown.	Flowering Period.	Remarks.
Asters (21 varieties)	Hotbed	April 6	July 27 to Oct. 13	Suffered rather badly from
Alonsoa Warscewiczii	. "	" 8	Aug. 3 to Aug. 22	blight. Very little bloom.
Alyssum, Sweet	Outside	May 8	July 11 to Oct. 13	Stood drought well.
Amaranthus, Tricolor		April 8	Ang 3 to Oct 13	Foliage plant. Very desirable flowers.
Balsam, Mixed		8	June 17 to July 27	Suffered badly from drought
Bartonia, Aurea.		" 8	June 12 to Oct. 13	No bloom.
Carnation (2 varieties)	66	1 " 7	Aug. 2 to Oct. 13	very nardy.
Castor Oil Plant, Bronze King		" 6.,		Foliage only, leaves three feet long.
Centranthus Macrosiphon		« 8	July 6 to July 21	Not handsome.
Chrysanthemum, annual Clarkia elegans		"· 8	June 18 to Aug. 27 June 15 to Aug. 23	Sparse bloom. Very handsome for early bloom.
Cockscomb	46	" 6	July 24 to Oct. 13	
Coreopsis (6 varieties)	11	" 8	July 6 to Oct. 13	
Cosmea or Cosmos	46	0	July 8 to Oct. 13 June 20 to Aug. 12	very handsome.
Dianthus Heddewigii	44	" 8	July 4 to Oct. 13	Very free bloomer.
Dimorphotheca Aurantiaca Godetia (6 varieties)	1	" 8 April 8	July 4 to Oct. 13.	Suffered severely in drought.
Everlasting Flowers (6 vari-			oury 2 to Aug. 21	Suffered severely in drought.
eties)	46		June 20 to Oct. 13	Stiff and unsightly.
Jacobaea (Double Mixed) Kochia Triehophylla	66	0,.	Aug. 1 to Aug. 27.	
Larkspur, Annual (3 varieties).	"	8	July 10 to Oct. 13	Very satisfactory.
Linum Grandiflorum Lobelia, tall (2 varieties)	,,	0	July 6 to Oct. 13 July 6 to July 31	Did not do wall
Marigold, Double French		0		Did not do well.
Mixed	66	" 8	June 17 to Oct. 13	
Mignonette, Sweet Scented Nasturtium (8 varieties)		0	July 1 to Aug. 20 July 27 to Oct. 13	
Nemesia (4 varieties)	Hotbed	"· 7	June 15 to Oct. 13	Suffered severely in drought.
Nicotiana affinis	66	" 8		Did not bloom.
Petunia (4 varieties)		" 6.	June 15 to Oct. 13.	Suffered from drought. Very vigorous and hardy.
Phlox Drummondii	"	" 7	June 21 to Aug. 8	Suffered from drought.
Pyrethrum, Golden Feather Portulaca, Improved Double	"	. 8		Border plant.
Mixed	46	" 8	July 6 to Oct. 13	
Rudbeckia, Golden Sunset	60	" 8	July 6 to Sept.16	e ES a la la
Salpiglossis, Large Mixed Salvia (2 varieties)	"	" 6		Fine bloom. Did not bloom.
Scabious or Scabiosa	"	" 7		Did not bloom.
Schizanthus	"	" 8 " 6	June 17 to Oct. 13. June 22 to Oct. 13.	Made excellent showing. Not as fine as usual, on account
Swan River Daisy or Bracy-				of drought.
chome	" O4-:-1-	" 7	June 20 to Oct. 13 July 7 to Oct. 13	NY-+1 1 1
Sweet Pea (64 varieties) Sweet Sultan (3 varieties)	Hotbed		July 8 to Oct. 13	Not so good a showing as usual stood drought well; splendid
				cutting.
Verbena (2 varieties) Viscaria	"	8	June 18 to Oct. 13	Very pretty.

PLATE LVII



Silvia Apple Tree, Brandon Experimental Farm.



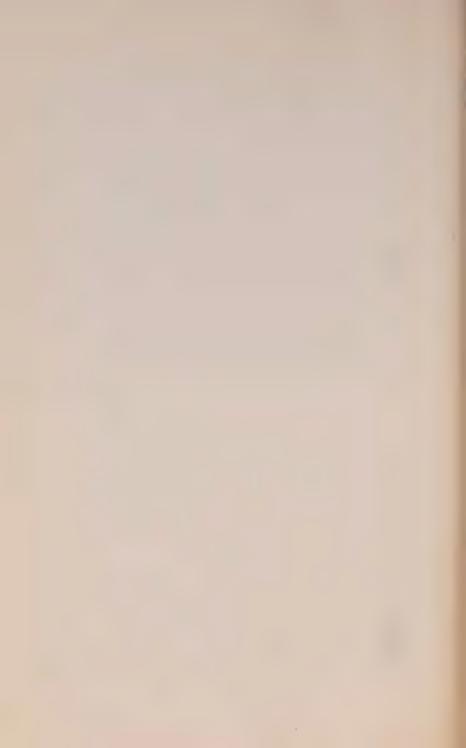


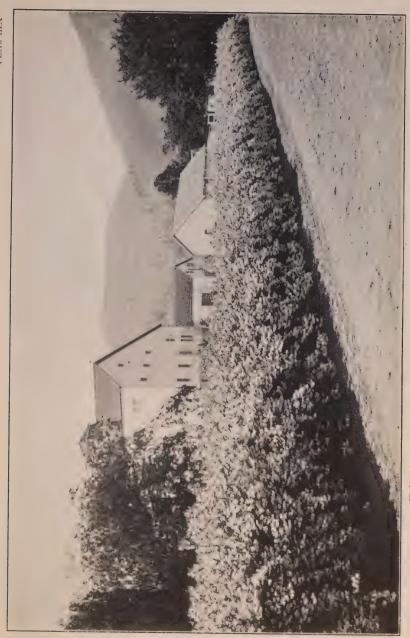
Native plum tree in bloom, third spring after being set out.

Lethbridge Experimental Station.

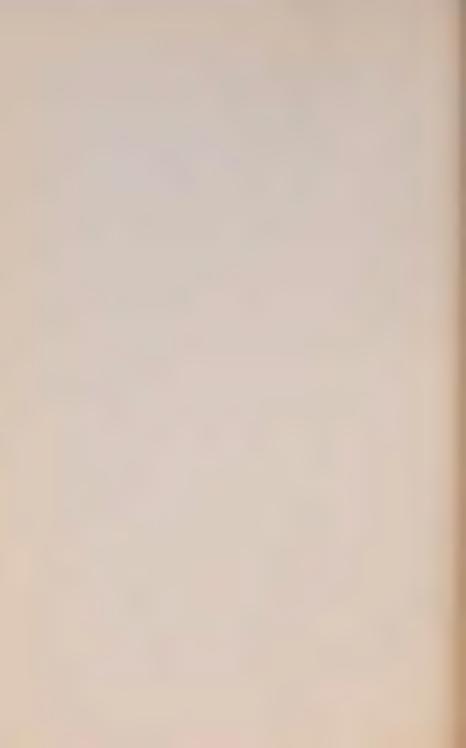


Tulips. Lethbridge Experimental Station.





Hedge of Deutzia gr citis, Early May Blossoms, Experimental Farm, Agassiz, B.C.





Fort Vermilion, Alta. Corn and Beans.



Fort Vermilion, Alta. Cabbage and Cauliflower.



EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE SUPERINTENDENT, T. J. HARRISON, B.S.A.

SEASONAL CONDITIONS.

On the Indian Head Farm the season of 1914 was the most unfavourable from a horticultural standpoint that has occurred for several years. While the moisture in the soil from the previous fall and early spring rains caused a fairly good germination of flower and vegetable seeds, the dry weather, accompanied by a hot southwest wind which prevailed from the 9th of May until the 18th of June, killed many of the young plants. The unusual number and kinds of insect pests also caused considerable damage to the trees on the avenue, the flowers, and the vegetable gardens. On August 9 the temperature dropped to three degrees below freezing, causing a complete loss of all the more tender vegetables and flowers.

VEGETABLES.

The vegetable garden gave promise in the spring of being very successful, but the dry weather, cut worms, and finally the frost, so damaged it that both the quality and quantity were inferior to previous years.

Asparagus.—The old bed of asparagus in which were Barr Mammoth, Barr Elmira and Conover Colossal varieties, again produced an early crop of tender sprouts. These beds received very little attention other than the removal of the tops and mulching lightly, with rotted manure in the fall. It would seem that this is a vegetable that should receive more attention in the vegetable gardens in Saskatchewan since it is the first to produce in the spring and requires very little attention once it has been established. Three new beds of Palmetto, Columbia Mammoth and Colossal were planted in 1913, but have not yet started bearing.

Beans.—The beans were planted in drills in the garden on May 18, and were cultivated with the horse cultivator and hoe to keep down the weeds and form a mulch between the rows. The table below gives the varieties under test with the date they were in use:—

Variety.	In Use.	Ripe.	Remarks.
Stringless Green Pod Bountiful Green Bush. Grennell Rustless Wax. Refugee or 1,000 to 1. Golden Wax Keeney Rustless. Valentine Wax. Wardwell Kidney Wax Extra Early Valentine. Extra Early Refugee.	" 24 " 22 Aug. 3 July 24 " 22 22	Sept. 2	Good crop. Good crop. Did not ripen. Light crop. Medium crop. Large crop.

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Beets.—The beets were planted on May 18, in drills about 16 inches apart. As they were not affected to any extent by the cut worms or frost they produced a fairly good crop. Nine different varieties were tested with the following results:—

Variety.	In Use. Yield.		Remarks.
Eclipse Early Blood Red Turnip. New Metcor. Ruby Dulcet. Cardinal Globe Danish Blood Turnip. Egyptian Dark Red Flat. New Early Black Red Ball. Early Flat.	" 27 " 30 " 30	618 40 609 00 580 00	Extra good crop. Good crop. " " Medium crop. " " Light crop.

Brussels Sprouts.—Brussels sprouts are not grown in many gardens in the province, but on the Experimental Farm have always given good success. This season they were planted in the hot-house on March 28 and transplanted to the garden on June 1. A fair crop was obtained, the average weight of one dozen heads being forty pounds.

Celery.—Celery is a crop that is receiving more attention each year. The fact that it can be stored in the winter and come on the table with much of the freshness of a green vegetable makes it very desirable in the West. Last season it was sown in the hothouse on March 24 and transplanted on June 15. The different varieties were planted in trenches made as follows: The trench was dug 18 inches deep and 12 inches wide, in the bottom of the trench 6 inches of well rotted manure was placed. On the top of the manure 6 inches of the top soil was tramped in solid and the celery planted in this soil. On account of the dry season it was found necessary to water twice a week. The yield was fair and the quality good. The following varieties are among those recommended:—

Variety.	In	Use.	Weight per dozen Heads.
Giant Pascal Evans Triumph Noll Magnificent Paris Golden Yellow French Success Improved White Plume White Plume	Oct. Sept. Oct. Sept. Aug.	6 7 28 20 20	Lb. 18 12 12 11 11 9 8

A test was also made of several rows planted on the level, but neither the quality nor yield was equal to those planted in the trenches.

Garden Corn.—Twelve varieties of garden corn were planted on May 18. They all matured sufficiently for table use, the Squaw sorts, however, were the only ones that matured sufficiently for seed.

Variety.	In Tassel.	Ready for Use.	· Remarks.
Early Iowa Pocahontas Sweet. Metropolitan Early Dawn. Perkins Extra Early Market Extra Early Adams Golden Bantam. Early Fordhook Early Malcolm Malakoff. Red Squaw White Squaw	Aug. 1 July 20 Aug. 1 July 28	" 19 " 17 " 24 " 20 " 20 " 17 " 24 " 21	"

Citrons.—The seed was planted in the hot-house on March 28, and transplanted into the garden on May 29. Very little fruit had set by August 9 when the frost destroyed all the vines.

Cabbage.—Eighteen varieties were sown in the hothouse on the 28th of March, and transplanted to the garden on May 29. These all made a good growth the early part of the season. Later in the season the cabbage butterfly did considerable damage. If the plants had not been treated, a complete failure would have resulted. The most effective method of treating was found to be Paris green. It was applied in a mixture of 4 ounces of Paris green to 40 gallons of water.

Variety.	In Use.	Average weight per head.	Remarks.
		lb.	
Late Flat Drumhead	Aug. 14 "28 "4 "4 "4 "4 "28 "28 "28 "4 "31 "31 "31 "31 "31 "31 "31 "32 "25 "25 "25 "25 "25 "25 "25 "25 "25 "25 "25 "25 "25 "25 "25 "25 "25 "25 "25 "27 "25 "27 "25 "27 "25 "27 "27 "25 "27	6 6 5 5 5 4 4 2 3 4 2 3 4 3 3 4 3 4 3 4 3 4 3 4 3	Good heads. "" "" "" Medium heads. "" Good heads, Fair heads. Médium heads. "" Small heads "" ""

Cauliflower.—Four varieties were planted in the hothouse on March 28 and transplanted to the garden on May 29. As with the cabbage, the butterfly gave considerable trouble and was only kept in check by the continual application of Paris green, applied after the heads had been tied up. If used in this way, very little, if any, of the solution reaches the head itself.

Variety.	Average per head. weight.	Remarks.
Early Snowball. Extra Early Erfurt, Dwarf. Danish Giant. Veitch-Autumn Giant.	$2\frac{1}{2}$ $2\frac{1}{4}$	Medium heads. Small heads. Heads useless.

Carrols.—Two varieties of garden carrots were planted on May 2. The seed germinated well, but early in June the plants were attacked by cutworms, which destroyed about fifty per cent of the crop. The whole crop would have been destroyed if their ravages had not been checked by the application of bran and Paris green. This is prepared by mixing one pound of Paris green to forty pounds of bran and moistening slightly with water sweetened with sugar or molasses. This is scattered along the rows in the evening before the worms come out to feed. They eat the bran instead of the plant and in this way two or three applications will exterminate the pest. The two varieties of carrots gave the following result:—

Variety.	In Use.	Dug.	Yield.
Improved Nantes	July 30	Oct. 6	Bush. lb.

Cucumbers.—Five varieties were planted in the hothouse on March 29 and transplanted to the garden after the danger of frost was past. A heavy crop of fruit set on all varieties, but was destroyed by frost before any had been gathered. Those that showed the heaviest crop were Giant Pera, Prize Pickling and Extra Early Russian.

Lettuce.—There were ten varieties under test. Two sowings were made of each variety, the first on May 2, and the second on June 20. Due to the dry weather the crop from the first seeding was not up to the average, while the second seeding was almost a complete failure. The result of the first seeding is given below:—

Variety.		Remarks.	
Red Edged Victoria. Unrivalled Summer Rousseau Blond Winter Dark Green Capucine Giant Crystal Head. Grand Rapids. Hanson Improved. Simpson Black Seeded Iceberg. Drecr All Heart.	" 20 " 18 " 24 " 25 " 24 " 18 " 20 " 18 " 20 "	Poor crop. Fair crop. Poor crop. Good crop. Fair crop. Medium crop. Good crop. Poor crop.	

Musk Melon.—One variety, Salzer Earliest Ripe, was started in the hothouse on March 24 and transplanted to the garden on May 29. Considerable difficulty was experienced in getting the fruit to set. Eventually a number of good melons were obtained and by protecting them at night were ripened and proved to be of excellent flavour.

Onions.—Thirteen varieties were sown in the garden on April 18. The seed germinated well, but the young plants were attacked by the cutworm and onion magget to such an extent that a report on the yields of the experiment would be worthless.

Garden Peas.—Sixteen varieties were under test. The seed was sown in the garden on May 2, and fair yields were obtained, although cutworms attacked the young plants and thinned them out considerably before the application of poisoned bran. The table below will give the date on which the different varieties were ready for use and ripe:—

Variety.	Ready for Use.	Ripe.
Dainty Duchess. Gradus Sutton Excelsior. McLean Advancer. Gregory Surprise. American Wonder. Premium Gem. Heroine. Lincoln. Juno. Stratagem Thos. Laxton. Telephone. Early Giant. Quite Content.	July 25 7 7 20 8 30 July 4 June 30 July 20 20 25 27 4 23 4 4 4 4	Aug. 17. 16. 10. 14. 10. 110. 110. 110. 110. 111.

Parsley.—One variety, Double Curled, was sown in the garden on May 2. It was ready for use on August 20, and gave an excellent yield.

Parsnips.—Two varieties were under test. The seed was sown in the garden on May 2, and the roots were ready for use October 10. Intermediate is much shorter than Hollow-Crown and is, therefore, much easier to dig. It also gave a heavier yield as will be noted from the table below:—

Variety.		Dug.	Yield.
	· · · · · · · · · · · · · · · · · · ·		
Crown.		Oct. 6	Bush. lb. 232 0 193 20

Potaloes.—Twenty-three varieties were under test this year, but owing to the extremely dry season the yields were very disappointing. A number of interesting experiments were started, such as, the number of eyes per seed; different depths of planting; distance apart in the row; imported versus home-grown seed and seed selection. Although some interesting results were obtained it is not deemed advisable to use the data in this report, as the season was so abnormal the results might be misleading. The following table will give the yields of the different varieties which were planted in clay loam on May 26 and dug on September 28.

POTATOES 1914.

Nọ.	Variety.	Growth.	Size.	Form.	Colour.	Yield p	er Acre.
1 2 3 4 4 5 6 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23	Irish Cobbler. Eureka Extra Early Wee MacGregor. Vick Extra Early Early Hebron Whiting Beauty Gold Coin. Early Norther Early Ohio Late Puritan Bermuda Early. Carman No. 1 Droer Standard Everett. Houlton Rose Manitoba Wonder. Empire State. Table Palk. Dalmeny Beauty Rawlings Kidney Morgan Seedling New Queen. Money Maker	Strong Medium Strong Medium Strong Medium " " " Strong Medium " " " Strong Medium " " " " " " " " " " " " " " " " " "	Large " " " Medium " " Small. Medium " " " " " " " Small. Medium " " Small. Medium " Small. Medium	Oval	Pink. White Pink. White Red. White Pink. White Red. White	198 164 159 149 135 130 130 125 120 116 116 113 111 106 101 99	Lb. 15 10 20 30 50 20 30 40 40 40 40 40 20 35 10 20 30 30 30 30 30 30 30 30 30 30 30 30 30

Radish.—Two varieties, Forcing Turnip Scarlet, and Early Scarlet White Tipped, were under test. Three plantings were made, the first on May 2, the next on June 20, and the last on July 2. Both varieties gave a large yield and good quality from the first seedings; the second seeding was only fair, while that sown on July 2 was almost a failure.

Squash.—Ten varieties were under test and gave promise of a fair crop until August 9, when all were destroyed by frost.

Salsifiy.—One variety, Long White, was sown in the garden on May 18. This made a good growth of top, but the roots were so fibrous that they were useless for cooking purposes.

Tomatoes.—Sixteen varieties were planted in the hot-house on March 24 and transplanted into the garden on June 3. A heavy crop of fruit set on most varieties, but all were destroyed by frost on August 9. One plant of each variety was trimmed back to two stalks to see what effect close trimming would have on the quantity and earliness of the fruit. At the date they were killed by the frost it would appear that the crop was heavier, more uniform and considerably farther advanced than on the untrimmed vines. Among the different varieties Alacrity No. 14, a variety received from the Central Experimental Farm, gave promise of an exceedingly heavy crop. This is also the earliest maturing variety under test.

Table Turnips.—Three varieties were sown in the garden on May 2 and pulled on October 7. Favourite gave a heavy crop of medium sized roots of fine quality and was much superior to the other sorts.

Variety.	Yie	ld.
Favourite. Extra Early White Milan. Early Flat Strap Leaved.	Bush. 966 715 580	Lbs. 40 20

ANNUAL FLOWERS.

Owing to the dry season the annual flowers were not up to the average in either quantity or quality of bloom. The varieties which made the best showing were sweet peas, stocks, verbenas and Petunias. The asters were badly affected with rust and consequently did not give nearly as profuse a bloom as last season. The table below will give a number of the varieties under test this season.

	Transplanted		
Variety.	to garden.	. In bloom.	Remarks.
	garden.		
Antirrhinum (6 varieties)		July 27 to Oct. 10.	
Antirrhinum (7 ")	10	7 to Aug. 26	11 11
Asters (8 varieties)	3	" 27 to Sept. 15	Badly rusted.
Ageratum, Improved Dwarf	12	n 20 to n 10	Good show.
Amaranthus	" 11	11 24 to Aug. 9	
Asters (13 varieties)	" 4 " 11		Affected by rust. Fair amount of bloom.
Alyssum (sweet)	it 6	4 to Oct. 14	ran amount of bloom.
Amaranthus	11 5		Frozen off Aug. 9.
Balsam (mixed)	11	I) 00 . C . 1W	
Bartonia aurea	n 5	July 20 to Sept. 17	Good amount of blocm.
Candytuft (mixed) Carnation (Marguerite)	и б	" 27 to Oct. 10	Did not serminate.
Castor Oil Plant	Lune 6		Fine foliage, no bloom.
Centranthus	11 6,	Aug. 11 to Sépt. 10	Fair amount of bloom.
Chrysanthemum (mixed)		June 19 to " 9	
Clarkia elegans (mixed)		July 28 to Oct. 10 June 20 to Aug. 9	
Cosmos	11 4	11 18 to 11 9.	Aug. 9.
Cosmos (I. Head seed)	n 4	_ 11 17 to 11 9	n Aug. 9.
Convolvulus (major, double)		July 7 to " 9	70 1 11
Daisy (double)	11 5	Aug. 4 to 11 15	Fair amount of bloom.
Dimorphotheca (Hybrid)	4	June 18 to Sept. 10	
Dimorphotheca (I. Head seed)	n 4	11 18 to 11 10	Good.
Eschscholtzia	11 6	July 27 to Oct. 10.	
Evening Primrose		Aug. 9 to 11 20	Old not bloom.
Gladioli (12 varieties)		July 3 to Sep. 17	
Helichrysum (6 varieties)	July 15		City mad blows
Helichrysum (I. Head seed)	June 6	÷ ; · · · · · · · · · · · · · · · · · ·	Killed off.
Larkspur (Rosy Scarlet)		July 4 to Oct. 24	Fine show of bloom.
Larkspur (blue)			11 11
Lavatera rosea splendens (Mallow)		Aug. 11 to Oct. 14	Good show of bloom.
Leptosiphon (Hybrids)		n. 11 to Sep. 10	

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ANNUAL FLOWERS—Concluded.

Variety.		asplanted to arden.		In	h]	loom.			Remarks.	
Linum grandiflorum. Lobelia (Ramosa Blue) Lupinus (mixed) Lupine (I. Head seed) Marigold (Double French). Mignonette Nasturtium (9 varieties) Nicotiana (Hybrids) Pansy (8 varieties) Petunias (4 varietles) Petunias (4 varietles) Poppy (Double Paeony flowered) Poppy (Double Paeony flowered) Poppy (Shirley) Rudbeckia Scabious (Large flowered mixed) Schizanthus (Hybrids) Stocks (6 varieties) Swan River Daisy Sweet Sultan (mixed) Sweet Fass (Spencor Seedling) Verbena (Mixture) Viscaria cardinalis Virginian Stocks (I. Head seed).	n n n n n n n n n n n n n n n n n n n	6 12 6 4 6 10 5 10 5 5 5 6 6 6 6 6 6 6 6 6 4 6 4 6 4 6 4 6 4 6 4 6 4 6 12	June July July July July July July July July	30 9 19 28 4 4 24 28 18 28 27 27 24 19 11 7 4 10 4 7	to t	Aug. Sept. Sept. Oct. Sept. Oct. Sept. Oct. Sept. Oct. Sept.	9 4 22 4 9 15 27 22 4 10 17 17 10 14 8 8 10 22 10	Froze Fair s Plant Good Good Froze Fine s Good Very Fair s " Good Very Good Fair s " Fair s " Fair s	n off show of bloom. s weak did minate. sloom. show. show. n off. show. " fine. show. show. " good. show.	ro

PERENNIALS.

On the average farm in southern Saskatchewan more attention should be given to the perennial flowers as they do not require the attention that is given to the annuals, and give a magnificent bloom. For this reason considerably more space is being given to these each year on the Indian Head Farm. In 1912 a border twelve feet wide and four hundred and twenty feet long was laid out and planted with hardy sorts. This season an addition of over one hundred feet was made to this. Owing to the dry season the quantity and quality of the bloom was not up to the average, but was, nevertheless, well worth the trouble that had been taken in mulching and cultivating the border. Below is a table showing the varieties that bloomed this season:—

Variety.	In bloom.	Remarks.		
A '1 ' /Para Orana'	T 10 4- 4 19	77		
Aquilgeia (Rose Queen)	June 19 to Aug. 12 July 23 to Sept. 2			
Clematis rectu	1 to July 18.			
Campanula		Pair o o		
Comfrey		Good 11 II		
Dianthus	" 25 to " 31	11 11 11		
Delphinium	July 13 to Aug. 16	11. 11		
Dianthus	June 25 to Sept. 25.	0 0 0		
Dielytra (Bleeding Heart)		Fair "		
Dictamnus (Gas Plant)	" 22 to " 4.	1 11 11		
kerman Iris		shood u u		
Gypsophila (Chalk Plant)		Fair "		
Hemerocallis	July 10 to Aug. 2.			
Helenium (Sneeze weed)		Fair " "		
Helianthus	July 7 to Sept. 17.	Good n n		
Lilium elegans	" 1 to Aug. 4.	Fair "		
Lupinus	June 19 to July 28	0 0 0		
Perennial Phlox	Sept. 1 to Sept. 20	Good n n		
Paeonia	July 7 to Aug. 24	11 17 11		
Platycodon	11 18 to 11 20	Fair " "		
Perpetual Carnation	Aug. 30 to Oct. 15	Good " "		
Rudbeckia	" 11 to Sept. 10	Fair a a		
Siberian Iris	June 10 to July 8	Guod 11 11		
Sweet William		11 11 11		
Shasta Daisy		0 0 0		
Spiraea (Dropwort)	28 to July 28			
Scarlet Lychnis		Good "		
l'halietrum	" 25 to July 22	0 18 . 15		
Trollius (Globe flower)	14 to 11 20	11 11 11		
Veronica (Iron weed)	" 15 to Aug. 26	Fair " "		
Yarrow	" 20 to Sept. 10	0 11 11		

BULBS.

Each fall several thousand bulbs of tulips, narcissus, and crocus are planted and give a magnificent show of bloom early in the spring. After the bloom is over the bulbs are taken up and annual flowers put in their place. By following this plan bloom may be obtained from the early spring to the late autumn.

TREES AND SHRUBS.

The past season was not a favourable one for trees and shrubs. The Manitoba maple was attacked, shortly after leafing out, with the larvae of the fall canker worm. On the avenue many of the trees were defoliated before their ravages were checked by the use of Paris green spray. In all six or seven miles of avenue were sprayed

INDIAN HEAD.

for this insect. Later in the season the leaf roller did some damage but not extensively. The larch or tamarack was also attacked by the larvae of the larch saw fly, but as only a few specimen trees of this sort were growing in the arboretum, the insects were easily controlled by the use of Paris green spray. In an endeavour to straighten out some fields two wood lots that were planted in 1892 and 1895, totalling an acreage of $7\frac{1}{2}$ acres, were cut out; in all 85 cords of wood were obtained. This was both Manitoba maple and green ash, which should make first-class firewood.

Flowering Shrubs.—The flowering shrubs came into bloom early but the dry weather caused the flowers to wither shortly after they were in bloom. Among the sorts recommended for the average farm are Caragana arborescens, Caragana pygmæa, lilac, spiraea, honeysuckle and a few of the hardy roses.

Ornamental Hedges.—There are thirty specimen hedges in the arboretum, which are kept closely trimmed during the growing season. Those that have proven most suitable to western conditions are: Siberian pea tree (Caragana arborescens), native choke cherry (Prunus virginiana), Manitoba maple (Acer Negundo), common lilac (Syringa vulgaris), Japanese lilac (Syringa japonica), blue spruce (Picea pungens), white spruce (Picea alba), and balsam fir (Abies balsamea). The last three are recommended where a high hedge is required.

BUSH FRUITS.

The plantation of small fruit bushes being only one year old, no fruit of any consequence was obtained this season. Most varieties made a satisfactory growth of well matured wood and went into the winter in splendid condition. Below is a list of those at present under test:—

Red Currants-Greenfield Red. Perfection. Red Dutch. Red Grape. Red Cross. Rankin Red Victoria Red. Wilder. .White 'Currants-White Grape. White Cherry Large White. Verrieres White. White Imperial. Black Currants-Boskoop Giant. Collins. Clipper. Eagle. Dominion. Eclipse. Magnus. Kerry. Saunders.

Black Currants-Con. Victoria Black, Topsy. Gooseberries-Ruth. Downing. Ramsay Smith Improved. Richland Houghton Red Jacket. Mabel. Rideau. Silvia. Carman. Pale Red. Raspberries-Early King (red). Marlboro (red), Dr. Reider (red) Cuthbert (red). Sunbeam (red). Herbert (red). Golden Queen (yellow), Hilborn (Black Cap). Blackberry-

PLUMS.

In the plum orchard are a number of cross-bred varieties obtained from Professor N. E. Hansen of the South Dakota Agricultural College in 1908. There are a number which have produced a good preserving fruit and are proving sufficiently hardy to thrive in our climate. Among those and others that have produced good fruit are: Aitkin, Tapa, Wastesa, Hanska, Eyami, Inkpa, Yuteca, Winnipeg, Owanka and Assiniboine. The last named is an extra large plum, ripens early, and is of excellent flavour. This season some of the best varieties were budded on native seedling stock. Over 90 per cent of these buds "took." It now remains to be seen how they will come through the winter.

APPLES.

Up to the present a standard apple has not been matured at the Indian Head Farm. An endeavour is being made to originate or introduce varieties that will produce a good standard apple in this climate. Three methods are being tried out. The first is the planting of seedlings of standard varieties in nursery rows in order to get them acclimated. In 1912 about ten or twelve thousand seedlings were put out and last year eight thousand more were obtained from Ottawa. Almost every one has lived and made a good growth. It is now quite evident that this plan promises some success as none of those planted has shown any inclination to winter kill. Those set out in 1912 are now fine, strong trees and will be used next season to fill in the blanks in the different orchards, and it is hoped that from some of these we may obtain a tree that will produce a good, edible fruit. The second plan is to obtain standard apple trees two or three years old from a Western nursery and plant these in sheltered orchards. At present there are about two hundred trees that have come through the winter in good condition. These are mostly Russian varieties. The third method is an endeavour to produce an apple by crossing. As has been stated in former reports a number of Dr. Saunders' cross-bred varieties have proved a decided success on this farm. The fruit of these, however, is not very much superior to the ordinary crab apple produced in the east. A second cross with standard apple has been made. These trees have proven hardy, but have not yet started to fruit so that the quality cannot be reported on at this time. This season a large number of the first crossed apples produced a good crop of average sized fruit. The following is a list of a few of the better sorts and the weight of fruit obtained from each:-

Name.	· Picked.	Weight of fruit.
Jewel Seedling of Derby Columbia Seedling of Madge Robin Eve Seedling of Jewel Seedling of Jewel Seedling of Bank Lizz'e Seedling of Sparta Seedling of Tony Pioneer Tony Ruby Prince Alberta.	Hug. 28 11 28 11 28 11 28 11 28 11 28 11 28 128 12 2 11 2	Lbs. 55 29 35½ 28 15 26 31 23 17 26 24 30 65 23 38½ 25

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DISTRIBUTION OF SAMPLES.

Each spring a free distribution of samples of the products of the horticultural department is made to residents on forms in Southern Saskatchewan. These comprise tree and shrub seedlings, small fruit cuttings, tree and shrub seed, flower seeds, potatoes and rhubarb roots. Below is a list of those sent out during the past season:—

Trees.—Five hundred and sixty packages each containing seventy-five seedlings of Manitoba maple and green ash.

Shrubs.-452 packages each containing 50 assorted varieties made up principally of Caragana, Lilac and Honeysuckle.

Tree and shrub seed.—140 packages containing one pound of Manitoba maple, Green ash and caragana.

Flower Seed.—243 packages containing 4,680 packets of hardy annual and perennial seeds.

Potatoes. 2,648 samples of different varieties in three pound packages. Rhubarb roots.—145 packages containing 6 roots of superior varieties.

EXPERIMENTAL STATION, ROSTHERN, SASK.

REPORT OF THE SUPERINTENDENT, WM. A. MUNRO, B.A., B.S.A.

Horticulture is now an attractive part of the work carried on at this Station. The hedges and shrubbery have developed sufficiently to show the plan of arrangement and also to afford considerable protection to the flowers and vegetables. The bush fruits are sufficiently established to demonstrate the possibilities of the yield of the different varieties under test.

There is also a response to horticultural development in almost every household, both in town and country, and more especially in those newer districts along the lines of railway east and west, and north of Prince Albert. A great deal of credit for the work in horticulture is due the gardener, Mr. William Godfrey, to whose interest in the work and painstaking efforts in the carrying out of experiments and in details relating to the care of the grounds, much of the success is due.

THE SEASON.

The season of 1914 opened rather slowly, alternate spells of cold and warm days occurring from the middle of March. Seeding began on April 23, and work continued under favourable conditions. Occasional showers kept the crops growing and in thriving condition until early in July, but from then on, those on sandy or ill-prepared land suffered.

The rainfall in July of this year was the lowest for the same month since records of this Station began.

Following is the precipitation record in inches for the past four growing seasons, from April 1 to August 15:—

M nths.	1911.	1912.	1913.	1914.	Average for four years.
April	Inches. 0.86 2.38 3.55 2.99 0.43	Inches. 0 · 67 2 · 15 2 · 81 5 · 25 0 · 23 11 · 11	Inches. 0 · 26 1 · 26 1 · 87 3 · 80 2 · 24 9 · 43	Inches. 0 · 63 1 · 96 2 · 00 1 · 40 0 · 13 6 · 12	Inches, 0 · 605 1 · 937 2 · 557 3 · 33 0 · 76 9 · 17

VEGETABLES.

The dry season was favourable to the development of some vegetables, and detrimental to that of others.

The cabbage and corn were not up to the standard, and there were no cauliflowers matured until after the rains started towards the end of the season, although many heads started to form and then withered. The celery suffered most of all, and up to the time of the beginning of the rains in August was very poor. On the other hand,

the tomatoes did better this season than ever before at this Station. The inference is that tomatoes do better under dry conditions and that celery and cauliflowers would benefit by a liberal water supply throughout the growing season.

Tomatoes, celery, cauliflower, melons, and squash, gave better results by sowing seeds in pots and boxes in the house earlier than was safe to sow any seeds in the hotbed, and later placing the pots in the hotbed, than by sowing directly in the hotbed.

GARDEN BEANS.

These were sown on May 15 and were not picked when fit to use, but were allowed to ripen. The yields recorded are for ripe beans from a row thirty feet long.

Variety	Date of Blooming.	Fit for Use.	Weig 30 foo	ht off t row.
Bountiful Green Bush	July 6 " 6 " 13 " 26 " 11 " 6 " 11 " 11	July 20 " 18 " 26 Aug. 4 July 20 " 18 " 18 Aug. 1	lb. 3 2 2 2 1 1 1	oz. 0 10 9 4 12 11 10 8

BEETS.

Beets were sown on May 25 and thinned on June 25. Following is a table showing the varieties tested, and the weight of mature beets in a row 30 feet long:—

Variety.	Ready for use.	Weight in 3	0-ft. row.
		Lb.	Oz.
Rennie Cardinal Globe	Aug. 6	75 72	14 12
Early Blood Red Turnip Ruby Dulcet Egyptian Dark Red Flat	July 24	63	8 10
New Meteor	July 24	59 55	6
New Early Black Red Ball	Aug. 6	49	6

BRUSSELS SPROUTS.

Dwarf Improved was the only variety of Brussels Sprouts under test. It was sown in the hotbed on April 11 along with the cabbage and cauliflower, transplanted on May 27 and was ready for use August 9. Ten average heads weighed 46 pounds 12 ounces.

CABBAGE.

Fifteen varieties of cabbage were under test. These were sown in the notbed on April 11 and transplanted to the garden on May 26. The following table shows the date at which they were ready for use and the weight of ten average heads of each variety:—

Variety.	Ready for use.	Weight of hea	
		Lb.	Oz.
Flat Swedish	Aug. 28	120	11.
Flat Swedish Danish Summer Ballhead	₁₁ 21	85	·2
Large Late Flat Drumhead	28	81	9
Improved Amager Danish Roundhead	Sept. 11	77	14
Copenhagen Market		76	3
Fottler Improved Brunswick Shortstem		64	8
Extra Amager Danish Roundhead		63	2
German Nofalt		62	. 8
Magdeburg		61	9
Lubeck			4
	n 28	49	12
Extra Early Midsummer Savoy			15
Small Erfurt			7
Paris Market Very Early		41	5
Early Jersey Wakefield	Aug. 8	31	12

Cabbage received from R. Wiboltt, Denmark, too late to be sown with the other varieties was sown on May 16 and planted on June 24 with the following results:—

Variety.	Ready for use.	Weight of	30-ft. ⋄ o v
		Lb.	Oz.
Round Express Copenhagen Market True Danish Succession	Sept. 1	71 . 69	2 9 2 2
True Danish Succession	Oct. 15	62	2
True Danish Winter Roundhead	11 15	45	
Red Danish Stonehead	15	24	10

CAULIFLOWER.

Three varieties of cauliflower were sown on two different dates, April 11 and May 16, respectively, and transplanted on May 27 and June 24th. Following is a list of varieties showing date ready for use and number of ripe heads in 60 foot row:—

Variety.	Ready	for use.	Number of good heads in 60 foot row.
First Sowing. Danish Giant or Dryweather. Extra Selected Early Erfurt Dwarf Early Snowball	July	31 26	41 16 7
Second Sowing.		20 ,	
Danish Giant or Dryweather Extra Selected Early Erfurt Dwarf Early Snowball	Sept.	21 21 21	34 27 16

Three varieties of candidower were received from R. Wiboltt, Denmark, too late to be sown with the other varieties and were sown on May 16 and planted on June 24 with the following results:—

Variety.	Ready for use.	Number of ripe heads in 60 foot row.
Early Snewball. Dwarf Erfurt Danish Giant or Dryweather.	Sept. 16 Oct. 7	47 26 14

CUCUMBERS, CITRON, SQUASH AND MELONS.

The dry weather was favourable for the development of these plants, this being the first season we have been able to mature any of these fruits.

Cucumbers.—Five varieties of cucumbers were tried with the following results; these were sown in the hotbed on April 14, pricked out into the cold frame on April 30 and planted on June 3:—

Variety	Number of fruits from one plant planted in the open.	planted in hot-
Extra Early Russian. Prize Pickle Peerless or Improved White Spine. Giant Pera Cool and Crisp	30 21 7 6 5	21 65

ROSTHERN.

Citron.—One variety of citron, sown on April 14, pricked out on April 30 and planted on June 3, was ready for use from August 23 till September 15 and three plants yielded seven fruits weighing 15 pounds 5 ounces.

Muskmelon.—Three sowings were made of Salzer Earliest Ripe Muskmelon. First sowing was on April 5, potted on May 18, and planted in the open on June 3, formed fruit but none of them matured. Second sowing on May 6, planted in the hotbed on June 6 and kept under glass all summer yielded 21 fruits from ten plants. These weighed 33 pounds 10 ounces and were ready for use between August 19 and September 21. The third sowing on May 18, planted in the cold frame on June 20 and kept under glass all summer yielded 26 fruits from 18 plants. These weighed 40 pounds, 14 ounces.

One Pumpkin Connecticut Field, sown at the same time as the muskmelons and planted in the open did not form fruits but developed very rank vines.

CARROTS.

Two varieties of carrots from Vilmorin, Improved Nantes and Half Long Chantenay, were sown in the open on May 14 and were ready for use on August 6. The Nantes yielded 25 pounds 13 ounces from a 30 foot row and the Chantenay 31 pounds 10 ounces.

Three varieties of carrots from R. Wiboltt of Denmark, viz.: St. Valery Long Red, Improved Early Wanted, and Improved Scarlet Intermediate were sown on May 16 and ready for use on August 6. The yields from a 30 foot row were:—

St. Valery Long Red, 24 pounds 9 ounces.

Improved Early Wanted, 26 pounds 12 ounces.

Improved Scarlet Intermediate, 20 pounds 14 ounces.

TABLE CORN.

The dry weather was detrimental to the best development of the corn and Malakoff and Metropolitan Sweet did not become mature enough for table use. The corn was planted in hills on May 15 and the following table shows the relative earliness and yield of the five most promising varieties:—

Variety.	Ready for use.	Weight from 12 average hills.
Squaw (C.E.F.) Early Malcolm (C.E.F.) Early Dawn Golden Bantam Pocohontas Sweet	Aug. 28	6 8

LETTUCE.

Ten varieties of lettuce were sown, both in the hotbed for early use, and in the open for later use. Iceberg is considered the best of those tested.

ONIONS.

Two sowings were made of each of thirteen varieties of onions, one in the hotbed on April 11 which was planted in the open on June 2, and one in the open on May 14. There did not seem to be any advantage gained, either in yield or earliness from sowing in the hotbed and transplanting to the open, over sowing directly in the open.

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CELERY

Some difficulty is often experienced in starting celery because the seed is small and slow to germinate.

One sowing in the hotbed on April 11 did not come to maturity and another sowing in pots in the house on March 30, pricked out into cold frame on May 22 and planted on June 22, gave very fair results.

Variety.	Ready for use.	Weight of 15 foot row.
Dong Colden Vellow	3	Lb. Oz. 47 2 39 2 38 6 34 0 26 4 20 8 16 J5

Storing Celery.—Celery was kept fresh and crisp until May this year by packing it in moist earth in the cellar at time of digging. The plants were placed almost tight against one another.

TOMATOES.

The dry weather was favourable for the ripening of tomatoes. Ten varieties were grown under different conditions. One lot was sown in pots in the house on March 30, and the pots plunged into the hotbed when the hotbed was ready on April 30, transplanted to the open on June 1, and trimmed, and trained to a stake. The second and third lots were sown in the hotbed on April 11th, and planted in the open on June 6, the second lot then being trimmed and tied to a stake and the third lot left untrimmed and allowed to spread on the ground. Results are from one plant of each variety:—

Variety.	First Ripe Fruit.	N 10 5. IV	Fruits to Sept. 10.	Weight of Ripe	Fruits.	Weight of Areen Fruits	to Sept. 10.	First Ripe Fruit.		No. of Ripe Fruits to Sept. 10.	Weight of Ripe		Green Fruits on Sept. 10.	First Ripe Fruit.	No. of Ripe Fruits to Sept 10.	weight of Ripe Fruits.	Weight of reen Fruits	on Sept. 10.
Started in pots and trained to stakes.				ed			ed in h				Started	l in hot trail on						
				Lb.c	oz.	Lb.	oz.				Lb.o	z.	Lb.oz.			Lb.oz	L b.c)Z.
Alacrity	Aug.	6	67	15	3	19	6	Sept.	2	8	2	0	3 4	Sept. 10	1	0 5	5	1
Rennies XXX, Earliest Round		6	73	15	1	24	2	Aug.	10	3	0 1	11	0 14	u 10	4	0 14	7	0
Johnsen Jack Rose Prosperity	91	10 12	49 6 3	9 11	14 7	21 21	6	Sept.	2	3 5	0 1	8	0 10 3 14					13
Extremely Early I.X.L		6	126	29	4	20	12	**	2	5.	1	2	4 2	Sept. 10	3	0 15	13	2
Earliana, Sun- nybrook strain	11	8	58	13	1	21	10	Aug.	8	5	1	7	2 8				88	1
Chalk Early Jewel Florida Specia	1 "	12	77 75	20 15	13 5			Sept.			1 0'	2 15	4 5 3 12				22 3	10 15
North Adiron dack Bonny Best	. 17	30 15	56 74	10 14	7 2	26 27	9 7	Sèpt.	29 10		1 1	8		Sept.	4	0 14	5 7	14 9

ROSTHERN.

POTATOES.

The yield in potatoes this year was far short of any other at this Station since its establishment in 1909. There is also a change in some of the results of cultural methods from that of other years. This particularly applies to the depth of seeding and to the relative merits of hilled and level cultivation.

Following is a table showing the results of some of the leading varieties for the past four years, and the three and four year averages:—

• Variety	1911 Yield per acre.	1912 Yield per acre.	1913 Yield per acre.	1914 Yield per acre.	3-yr. ave. Yield per acre.	4-yr. ave Yield per acre.
	bush.	bush.	bush.	bush.	bush.	bush.
Dreer Standard	528	840	596	379	605	586
Morgan Seedling	475	848	634	362	615	580
Everett	497	824	523	372	573	553
Money Maker		828	498	353	- 558	547
Rawlings Kidney	479	804	562	326	563	543
Wee McGregor		774	574	326	558	
Gold Coin		841	514	307	554	
Table Talk		659	540	247	482	
Rochester Rose	453	807	526	326	553	528
Late Puritan	431	699	529	320	516	495
Empire State	585	590	478	316	485	472
Reeves Rose	484	659	456	316	477	479
Dalmeny Beauty	448	744	389	316	485	474
Vick Extra Early	431	625	, 515	316	485	472
Carman No. 1		536	530	313	459	434
Irish Cobbler	365	573	437	242	417	404

The following are the results for four years in comparing hill versus level cultiva-

Variety.	1911.	1912.	1913.	1914.	4-yr. ave.
Hilled	Yield per				
	acre.	acre,	acre.	acre.	acre.
	bush.	bush,	bush.	bush.	bush.
	225	620	567	244	414
	279	645	527	291	437

Potatoes have been planted at different distances apart with the following results for the past three years:—.

	1912.	1913.	1914.	3-yr. Ave.
12 inches between plants, 30 inches between rows	Yield per	Yield per	Yield per	Yield per
	acre.	acre.	acre.	acre.
	bush.	bush.	bush.	bush.
	557	505	271	478
	609	528	242	460
	570	394	242	402

Different depths of planting have given the following results for the last three years:—

	1912.	1913.	1914.
Planted 2 inches dcop	acre.	Yield per acre, bush, 531 540 526	Yield per acre. bush. 391 297 276

Two samples of Dreer Standard were cut at the same time, but planted two weeks apart with the following results: Cut and planted at once, 379 bushels per acre; cut and planted two weeks after cutting, 209 bushels per acre.

Conclusions derived from four years in growing potatoes: -

- (1) Varieties to plant, quality alone considered, Irish Cobbler, Vick Extra Early, Wee McGregor. Varieties to plant, yield alone considered: Dreer Standard, Morgan Seedling. Varieties to plant, quality and yield considered; Wee McGregor, Rawlings Kidney.
 - (2) Plant on summer-fallow manured with rotten manure.
 - (3) Cut sets to two eyes, and plant 12 inches apart in rows 30 inches apart.
- (4) Plant 4 inches deep, or shallower if the ground is clean, and cultivate before the plants are up.
 - (5) Hill the plants slightly and keep the ground between the rows well worked.

TREE FRUITS.

APPLES.

Of the trees planted in 1909 and 1910 only about thirty per cent are living and they are very much injured from winter-killing.

Of the one year old seedlings of Russian varieties received from Ottawa in 1912 and 1913 practically all are living and more than fifty per cent show no injury from winter-killing.

Four boxes of apples were received from A. P. Stevenson, Dunstan, Manitoba, in the fall of 1912 and the seeds were sown in a frame and left until they were one year old. They were planted in a nursery row in the spring of 1914 and eleven hundred of them survived the winter of 1914-15. It is hoped that from these large number of seedlings a hardy apple of good quality will be developed that is adapted to this climate.

PLUMS.

The settlers of this district are largely of German origin and many of them came here from Manitoba between 1894 and 1900 and brought with them some native plums from Manitoba. In many of the gardens there are now well developed plum trees yielding a fair amount of fruit of good quality. Of course these trees are of seedling origin and display many differences in point of earliness and quality. The Experimental Statien is securing trees of similar origin with a view to making a selection of something that may be more uniform and if possible earlier and of higher quality.

BUSH FRUITS.

BLACK CURRANTS.

These were planted in 1911 in rows six feet apart with the bushes 5 feet apart in the row. The yield in 1914 was as follows:—

Varicty.	No. Plants.	Total yield in pints.
Clipper Collins Prolific. Victoria Black. Buddenborg. Success. Eagle. Topsy. Boskoop Giant. Lee Prolific.	6 6 6 5 5 6 6 6 5	26 24 22 21 15 18 26 25

RED AND WHITE CURRANTS.

The fruit of many of the red and white currants did not set properly and fell off shortly after the bloom had disappeared. The following table shows the yield from some of the more promising varieties that were planted in 1911:—

Variety.	Colour.	No. Plants.	Yield in Pints in 1914.
Pomona Raby Castle. Stewart.	Red.	6	12
	"	6	6
	"	4	4
	"	6	27
	"	6	14
	White	6	6

RASPBERRIES.

Quality counts in raspberries and of those varieties tried at this Station the quality of the Herbert so far surpasses that of the others that it is unquestionably the variety to recommend for Northern Saskatchewan. Following are the yields from different varieties planted in 1911:—

Variety.	No. P anto.	Yield in Pints.
Turner Loudon King Sunbeam Herbert (planted in 1912)	15 23 23 22 4	11 35 13 22 14

ROSTHERN.

GOOSEBERRIES.

Most of the gooseberries planted at this Station have succumbed to the winter and of those that have withstood the winter there have been no satisfactory yields by which to determine their relative merits.

STRAWBERRIES.

Fair success has been attained with strawberries. They were covered with straw in the autumn after the ground was frozen and left covered in the spring until about the middle of May. The three varieties proved thus far to be most desirable are given below, the yield being that from a row 30 feet long, planted in 1912:—

Variety.	Yield in Pints.
Warfield Parson Beauty Dakota	11 6 11

FLOWERS.

The flower border extends along the south and east sides of the lawn and increases in beauty every year as the protection from the bordering shrubs develops.

The flowers are planted in massed clumps and show up well from the railway and public road. Some difficulty is experienced with the dry weather, but those varieties most resistant to drought are gradually selected to the elimination of others. The season is rather short for some varieties and these are started in the hotbed.

Tulips.—Tulip bulbs are received every year from Holland and planted in the autumn and well watered and covered with straw. As soon as the snow is gone in the spring they are uncovered and begin blooming the last week in April and continue for nearly a month. In 1913 the shipment arrived after the ground was frozen about four inches. Nevertheless the frozen ground was picked up, and the tulips were planted, and in 1914 they came on well and bloomed. The same bed does for a second year especially for those tulips of the Darwin variety. The Parrot tulips do not do as well.

Asters.—Unless the aster seed is sown in the hotbed or in boxes in the house the plants do not afford much bloom. In any case the bloom comes late in the season and is finally cut off with frost.

Antirrhinum.—Eighteen varieties were grown and they began to bloom early in August and continued until towards the end of October.

Balsams.—These did not begin to bloom until July 28, and were frozen down by a slight frost on August 10.

Carnations.—Two varieties, Improved Marguerite Mixed and Perpetual Early Flowering were in bloom from the middle of August to the end of October.

Corcopsis.—Five varieties were tried and were in bloom from the middle of July to the end of October.

Eschscholtzia.—Some mixed varieties came into bloom on July 11, and continued to the end of October.

ROSTHERN.

Nasturtiums .- Six varieties began to bloom in July and continued until the end of October.

Pansies.—Those of the year before began to bloom shortly after the ground was bare of snow and continued until after those from the new seeding were in flower. Plants from the new seeding began to bloom early in July and continued until the end of October. The Pansy is the one plant that affords bloom throughout the whole season.

Other plants which contributed much to the appearance of the flower border from. July to October were: Clarkia Elegans, Cockscomb, Dianthus, Godetia, Kochia, Larkspur, Lobelia, Marigold, Mignonette, Nemesia, Petunia, Phlox, Poppy, Stock and Verbena.

· Sweet Peas.—Collections—all of which gave very satisfactory results—were received from a number of seedsmen.

Gladioli.—Ten varities of gladioli were started in boxes in the hotbed and planted in the open on June 9th. They began blooming early in August and continued until hard frost at the end of October.

TREES AND SHRUBS.

In 1912 we desired a hedge across the north side of the plum orchard and secured some two year old Caragana plants and carefully planted them. At the same time we planted some Caragana seed in a nursery row. In 1914 the nursery row formed a thicker and more even hedge than those we had planted as two-year-old plants for hedge purposes.

A similar demonstration was made with regard to maple seedlings and trees from Russian poplar cuttings. If the seed or cutting is placed where the tree is wanted one is as far ahead in two or three years as if two year old seedlings had been planted. This is true of maple, caragana and Russian poplar but not of honey-suckle nor lilac because the early growth of these two is very slow.

The Lonicera, Syringa, Caragana, and Spiraea planted in the border in 1910 came into good bloom and were quite attractive by 1914.

Several of the mountain ash planted in 1910 and 1911 also came into bloom in 1914.

THE LAWNS.

An addition was made to the lawn last season by incorporating that piece of ground lying between the experimental hedges on the west and the foreman's house on the east. Also a portion, formerly in alfalfa, lying west of the Superintendent's house along the road and comprising about half an acre, was prepared for seeding in 1915.

Of various grasses and mixtures tried, the pure Kentucky Blue Grass makes the most satisfactory lawn. It seems to stand the drought as well as any, does not winter kill, and is even in colour and growth. White Dutch Clover is a desirable addition but it sometimes winter-kills.

EXPERIMENTAL STATION, SCOTT, SASK.

REPORT OF THE ACTING SUPERINTENDENT, MILTON J. TINLINE, B.S.A.

The summer of 1914 was extremely warm and dry, particularly so during the month of July, and the fore part of August. Hot winds prevailed during these two months, and had a disastrous effect on crops of all kinds. The rainfall came in small showers and seldom penetrated to the roots of the plants.

The vegetable gardens on many of the farms in this district were sown on new land that had not been properly prepared. The dry season was particularly injurious to such, and many settlers have had to dispense with vegetables for domestic use. The potato crop, in quite a number of districts, was almost a complete failure, while

in other sections about half an average crop was harvested.

On this Station corn and all late vegetables did not do well during the summer, and had only commenced to bear when the frost came in September. The drought also affected the flowers, resulting in a very small amount of bloom during midsummer, with an abundance during the autumn months. Only a few hardy varieties of bush fruits bore this season. The ornamental, and the large fruit trees made satisfactory growth. The results obtained are as good as could be expected under the unfavourable weather conditions.

EXHIBITIONS.

During the past summer an exhibit, in conjunction with the Rosthern Station, was put on at the Saskatoon Summer Fair. A strong feature of the exhibit from this Station was the display of flowers and vegetables.

EXPERIMENTS WITH FRUITS.

TREE FRUITS.

Experimental work with fruit trees is receiving considerable attention. A number of difficulties have been experienced in the past which will disappear when more shelter for the trees can be provided. The fruit trees, and the hedges for providing shelter, were planted at the same time. Some loss of fruit trees has been experienced. The hedges, however, are beginning to provide shelter from the strong winds, and they will as they become larger, on account of their arrangement, provide protection from the injurious effects of the sun during the early spring months.

A number of varieties of hybrid apples, produced at the Central Experimental Farm, are making a strong growth. Some of the most promising are Elsa, Tony, and

Northern Queen.

This year's addition to the orchard includes a number of second cross hybrid apple trees received from the Central Experimental Farm; a shipment of standard apple, plum, and cherry trees from a western nursery; 1,000 native plum trees from the Brandon Experimental Farm; 8,000 young seedling apple trees from Ottawa.

EXPERIMENTS WITH ORNAMENTAL PLANTS.

TREES AND SHRUBS.

The trees and shrubs have made satisfactory growth, notwithstanding the drought. A number of trees and shrubs were received from the Central Experimental Farm. These were used to fill vacancies in the arboretum and hedges, and to make additions to the ornamental plantings on the lawn.

Although the planting on the Station has only been carried on for the past four years, yet sufficient data have been collected to prove that there is quite a long list of trees and shrubs that will grow well in Northwestern Saskatchewan with no other care than the keeping the ground cultivated around the trees for the first few years.

DECIDUOUS TREES.

In newly settled districts where no trees are to be found, it is fast-growing trees that are in the greatest demand. Of the trees under test, Russian Poplar (Populus petrowskyana) and the Cottonwood (Populus deltoides) are two of the fastest growing. The Laurel-leaved Willow (Salix laurifolia) and Golden Willow (Salix Voronesh) are both quite hardy and free growers. Manitoba maple (Acer Negundo) and Green ash (Fraxinus pennsylvanica lanceolata), while not so rapid in their growth, are not so subject to disease, and are the most satisfactory for permanent plantations.

CONIFERÆ.

While evergreen trees are more difficult than deciduous to transplant and slower growing yet, once firmly established, the former are the better for windbreaks, and for ornamental purposes.

The White Spruce (*Picea canadensis*), Balsam Fir (*Abies balsamea*), and Lodge Pole Pine (*Pinus contorta Murrayana*) have proven hardy, and are used, not only in the Arboretum, but for hedges and ornamental plantings on the lawn where no protection is afforded by other trees.

FLOWERING SHRUBS.

Quite a number of flowering shrubs bloomed during the past season. One variety of the common lilac (Syringa vulgaris Congo) bloomed for the first time. A number of the Chinese species of lilac (Syringa villosa) bloomed quite freely. A splendid display was also made by the numerous varieties of caragana, spiræa, and bush honeysuckle.

HEDGES.

A number of the specimen hedges have grown very well. Among the most promising are the caragana, laurel-leaved willow, white spruce, and the Josika lilac.

HERBACEOUS PERENNIALS.

The collection of paconics received in 1913, has grown very nicely, and makes a splendid addition to the flower border. The German iris, while usually equally hardy, has not made such a promising start. The Chinese bell flower appears very hardy, and is a prolific bloomer.

Two biennials that have added greatly to the appearance of the border, are pansies and sweet william. The former bloomed from early spring until covered by the winter snow. While these two plants are biennial, they, nevertheless, reseed the beds, and thus a succession of bloom is maintained from year to year.

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The usual shipment of flowering bulbs was not received in the autumn of 1913. The bulbs from the previous year were left in the beds. The bloom during the spring was not 60 uniform as the previous year, but a good display was made.

A few scillas and narcissi, that had been planted in the garden, bloomed again, These bulbs, however, are not to be recommended for outside planting.

A test of varieties of tulips, narcissi, crocuses and hyacinths for flowering production during the winter, was conducted. The following are among the most suitable for pot culture:—

Tulips.—Murillo, Imperator Rubrorum, Couronne d'Or, Proserpine, Keizers-

*kroon, and Duchesse de Parma.

Narcissi.-Figaro, Sir Watkin, Emperor, Empress and Princeps.

Hyacinths.—La Grandesse, L'Innocence.

Crocuses.—Mixed.

ANNUAL FLOWERS.

While perennial flowers are very satisfactory, both from their economy of labour, and the permanency of the beds, yet in the newer districts annual flowers will be grown more largely for a few years.

On the Station, 160 varieties of annual flowers were under test last season. Most of the varieties were sown in the hot-beds, and transplanted to the garden early in June. This gives a much longer season for bloom than seeding outside.

A test was conducted with a number of kinds of the more rapidly growing flowers sown in the garden. Twenty-eight varieties were sown in a well cultivated piece of land. The results were very encouraging, notwithstanding the dry season.

The following list includes some of the more promising varieties for sowing in the open:—

Variety.	Began to Bloom.	Bloom Over.	Remarks.
Sweet Peas. Sweet Alyssum Bartonia aurea. Clarkia elegans. Lupinus. Linum (Scarlet Flax). Leptosiphon (Hybrids). Nasturtium. Sweet Sultan. Viscaria cardinalis	" 15" 20" 15" 25" 20" 15" 25" 20" 15" 15" 15" 15" 15" 15"	Oct. 16 " 16 " 21 " 21 Oct. 16 Sept. 20 " 21 Frost	Hardy, prolific bloom. Suitable for edging beds. Splendid in masses. Free blooming. Good for back-ground of garden. Splendid for bedding. Splendid for bedding. Affected by drought. Very good in masses. Splendid for bedding.

The following new annual flowers were tried out at this Station for the first time this year:—

Viscaria cardinalis.—Splendid for growing in masses. Height, six inches. A medium early bloomer.

Bartonia aurea.—A very free bloomer with bright yellow flowers. Height, fourteen inches. The seeds ripen quite freely here.

Leptosiphon (Hybrids).—This plant is quite suitable for edging, being only three inches in height, and quite a free bloomer. The flowers are of various colours.

BUSH FRUITS.

During the past few years quite a number of varieties of bush fruits have been planted. The exposure to which the bushes have been subjected has proven out the

SCOTT.

hardy kinds, and at the present time there are in the orchard 14 varieties each of red and black currants; 2 varieties of white currants; 7 varieties of raspberries and 2 varieties of gooseberries.

The following is a list of varieties that have proven hardy and borne fruit this past

Raspberries—Sunbeam.
Black Currants—Kerry, Magnus.
Red Currants.—North Star, Stewart.
Gooseberries—Houghton.

STRAWBERRIES.

The past two seasons have proven very unfavourable to strawberry culture, having been too warm and dry. Two of the hardiest of a number of varieties tested were Dakota and Warfield. Both of these varieties fruited this last season.

EXPERIMENTS WITH VEGETABLES.

All the vegetables, with the exception of potatoes, were grown on the area set aside for vegetable tests. The soil is a dark chocolate loam, and was summer-fallowed in 1913. The plan of having sufficient land so that one-half the garden plot can be summerfallow, putting the garden in on summer-fallow land each year, appears to be one that the farmers in Northwestern Saskatchewan, could follow to good advantage. By following, this method the weeds are more easily kept under control, and sufficient moisture is available for successful gardening. Also, the farmers are enabled to do most of the preparatory work for the garden during the summer months, when their time is not so taken up with other farm work.

Weather conditions, as has been previously stated, were not conducive to large

yields of vegetables. The quality, for the most part, was very good.

A quantity of seed from some of the best varieties of peas, beans, lettuce, and radish was saved, and will be tested against imported seed.

POTATOES.

The past season has been unfavourable to the potato crop. The dry weather during mid-summer checked the growth of the tubers until the late August rains came. The earlier maturing varieties had attained a fair size before their growth was stopped by the drought and thus matured before the autumn frosts. The later maturing varieties, however, did not ripen, and were harvested with the tubers immature, thus decreasing their yield.

A comparative test of the popular varieties of potatoes, has been conducted for three years. The following table gives the average results of 19 varieties that have been under test for this period;

POTATOES.—Test of Varieties.

Variety.	Size.	Type.	When Mature.	Average Yield For 3 Years.	
			,	Bush.	Lb.
Empire State Dalmeny Beauty Everett. Irish Cobbler Late Puritan. Vick Extra Early. Reeves Rose Hard to Beat. Factor.	Medium Large. Medium Large. Medium Large. Medium Large. Medium Large. Medium Medium	Kidney " Oval " Long " " " " " Long Pink " White Oval " " " Pink " White " Pink " White Oval " " Oval "	Late	298 284 275 260 251 248 244 242 219 218 215 212 205 176 155 146 115	22 43 9 42 34 50 29 29 17 45 48 31 22 17 46 28 31 10 29

DISTANCES APART IN PLANTING POTATO SETS.

In addition to the test of varieties, a test of distances apart in planting potatoes was also conducted during the past season. The Wee McGregor variety was used for the test. The sets having three strong eyes each, were planted on May 23, at the distance apart outlined in the following table. The crop was harvested on September 23:—

POTATOES PLANTED AT DIFFERENT DISTANCES APART.

No.	Distance Apart	Distance Apart	Yield per Acre,	
	between Rows.	in Rows.	1914.	
1	Inches.	Inches.	Bush. Lb.	
	30	12	269 3	
	34	14	176 14	
	36	16	185 6	

BEETS.

Seven varieties were sown in the garden on May 21, harvested on September 29. The following varieties have been under test for the last three years:—

Variety.	Yield per Acre, 1914.	Average Yield 3 Years.	Remarks.
Early Blood, Red Turnip	Bush. 900 687 697 810 697	Bush. 902 860 853 840 617	Large, medium shape. Large, uniform, excellent quality. Large, uniform, excellent quality. Rough, flattened. Seed badly mixed.

Ruby Dulcet was much below its average yield this season. It can, however, be safely recommended. Eclipse and Cardinal Globe were tested at this Station, for the first time, this year. They appear to be promising sorts.

CARROTS.

Two varieties of carrots have been under test for three years. Of these, Half Long Chantenay has given an average yield of 296 bushels. Improved Nantes has given an average yield of 293 bushels. Both varieties are of excellent quality, and can be recommended.

BEANS.

Of the ten varieties under test, Wardwell Kidney Wax and Valentine Wax are two of the best for this district.

BRUSSELS SPROUTS.

The variety Dwarf Improved was grown again this season, and produced a large number of fair 6ized sprouts on each stalk. Their slow growth, however, gave them rather a strong flavour.

CABBAGE.

Seventeen varieties of cabbage were sown in the hotbeds, early in April, and transplanted to the gardens on May 29. Of these, the Early Paris Market and Early Jersey Wakefield are to be recommended for early use. The Copenhagen Market is a medium early, and reliable variety from the standpoints of quality and yield. Flat Swedish is one of the heaviest yielding late varieties. Danish Summer Ballhead and Large Late Flat Drumhead might also be mentioned. Of the red varieties, Danish Delicatesse is the best that has been tested.

CAULIFLOWER.

Three varieties were tested; of these, Early Snowball gave the largest percentage of good heads, and was superior to the others in texture and flavour.

SCOTT.

CUCUMBERS.

Five varieties were under test. The dry season checked the growth in midsummer, resulting in some low yields. The Prize Pickling gave the heaviest yields, with Cool and Crisp second.

LETTUCE.

Ten varieties were tested. Of these, Iceberg is suggested for early use, and Giant Crystal Head and Dreer All Heart for later sorts.

ONIONS.

Ten varieties of onions were sown in the garden on April 18. Notes were taken on colour, shape, percentage of thick necks, etc. It was found that Red Australian Brown and the lowest percentage of thick necks, Red Globe and Johnston Dark Red Beauty the highest. White Globe gave a yield of 796 bushels per acre, and is a fine attractive onion. Danvers Yellow Globe was second, with a yield of 607 bushels.

PEAS.

Of the fifteen varieties under test, Gregory Surprise, and American Wonder are two of the best early sorts. Stratagem is one of the best later kinds. Quite Content, which was under test for the first time at this Station, bore some very fine large pods, which were well filled.

PUMPKINS.

Two varieties were tested. Of these, Connecticut Field gave the heaviest yield. The pumpkins did not become very large, but were of excellent quality.

TOMATOES.

Ten varieties were sown in the hotbeds early in April, and transplanted to the gardens on June 5. The plants were severely pruned during the early summer. The fruit was just beginning to ripen at the time of the frosts. It was found that the green fruit, placed in windows with a sunny exposure, ripened very well when brought in the house.

In addition to the above, parsnips, radish, turnips, salsify, and parsley were also tested, making, in all, twenty kinds of vegetables with a total of 136 varieties.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

In regard to the amount of moisture carried in the soil from 1913, which is always an important factor in considering any season's results, it might be said that the precipitation during the last four months of that year was light, amounting in all to only two and one-half inches. During this period heavy drying winds were prevalent with little or no snow on the ground so that the soil moisture was severely drawn upon. To counteract this in a measure, however, 3-63 inches of precipitation was received during the first three months of 1914, so that the soil was reasonably moist and in excellent condition when work on the land was started.

The first work on the land at the Station was done March 17. The ground froze up towards the latter part of March but opened again shortly and by April 4th there was not much frost left in the land. Unfortunately the rainfall during April and May, and until the latter part of June was very much less than usual. For this entire period no soaking rain was experienced, and what did come was in the form of light showers that were not sufficient to wet through the dry layer of two or three inches at the surface and connect with the moisture lower down. The fact that the total precipitation for April was only 0.5 of an inch and for May 0.3 of an inch fully illustrates how serious conditions were and how difficult it was to obtain a stand from seeds when sown. A wet spell during the last ten days of June revived things generally, but the dry hot July was too severe a strain on plant life and the result was that there was a practical failure of all vegetables on non-irrigated land except potatoes and late sown roots and corn, which were able to profit somewhat by the rains during August.

The last frost occurring in the spring was on May 12th when 29.8° was recorded but a temperature of 33.2° was registered on the 21st, when tender foliage was affected in certain localities. The first frost registered in the fall was on September 15th when 31.0° was reached but this appeared to do much less damage to foliage than one would expect; in fact it was not till the 7th of October, when 20.1° was recorded that potato vines were completely blackened. On this account the autumn was particularly favourable for late flowering annuals which made a brave showing till nearly the middle of October.

LESSONS FROM THE SEASON FOR THE DRY LAND FARMER.

On account of the excessive drought, the season has been, with the possible exception of 1910, the most trying that has been experienced in Southern Alberta since settlement has taken place. It is therefore fitting that we should look over the results, or perhaps lack of results, and draw as many profitable lessons as possible therefrom and, although trusting that we shall not soon be called upon to experience a similar one, be prepared as far as possible to make the best of conditions should they recur.

The necessity of having summer-fallowed land carefully prepared on which to plant the garden has never been emphasized more forcefully than in this year. Gardens planted on well fallowed land that grew no crop of any kind (weeds included) in 1913, did produce some vegetables this year while those not thus planted failed miserably. On this account it will perhaps be excusable to reiterate a few suggestions that have previously been given in this connection. The land on which a garden is

to be planted on a dry land homestead should not only have been carefully summerfallowed the season previous but should contain a liberal amount of barnyard manure, well incorporated therein. This can best be done by applying well-rotted manure just before it is ploughed for summer-fallow. Manure worked in in this way increases the ability of the soil to retain moisture, besides improving its tilth. Manure should never be applied on non-irrigated land the same season that the crop is planted. Every dry-land farmer should set aside for the kitchen garden just twice the amount of land that he intends to put in in any season. One-half should be manured as mentioned above. In May or early June it should be ploughed at least eight inches deep. During the rest of the season sufficient cultivation should be given to prevent the growth of all vegetation. The land should not be ploughed the following spring but be given sufficient surface cultivation to prepare a good seed bed. The chances of success are greatly increased by having a shelter belt of trees planted on the windward side (which is, of course, not necessarily on the north side) for besides protecting the land in a great measure from the effects of the drying winds, it is almost certain to collect a bank of snow, which is a great advantage. If conscientious cultivation is given so that a loose mulch is maintained at all times on the surface, it is surprising how well vegetables can be made to yield in even quite dry seasons. It is needless to point out the advantage of making the rows continuous and wide enough apart so that a horse cultivator can be used, which reduces the amount of hand-hoeing that would otherwise be necessary.

THE VEGETABLE GARDEN.

At the Station we are operating two farms, one irrigated and the other non-irrigated. So far the greater part of the work in horticulture has been carried on under irrigation. This season we did not have a vegetable garden on the non-irrigated farm although a large number of varieties of potatoes were tested without irrigation and owing to the August rains good yields were obtained. Corn also made an extremely creditable showing. Only early and extra early sorts were tried.

POTATOES (NON-IRRIGATED).

Twenty-six varieties of potatoes were tested. They were all planted May 5 on summer-fallowed land in rows 30 inches apart and the sets about one foot apart in the rows. The potatoes were cut in fairly good sized pieces and in such a manner as to leave as much skin as possible on each set. When the sets are cut wedge-shaped or in such a manner as to have a large part of the outside cut surface, the piece is more apt to dry out and fail to grow if dry weather is met with just after planting, and it is more apt to rot in case of very wet weather. They were all dug October 20. The yield was computed in each case from 1/100 of an acre.

No.	Variety.	Total Yield per acre.	Yield per acre marketable.	Yield per acre unmarketable.
25.	Irish Cobbler	Bush. 1b. 400 00 398 20 380 00 373 20 371 40 355 00 355 00 353 20 336 40 306 40 300 00 298 20 290 00 288 20 286 40 253 20 266 40 253 20 266 40 251 40 250 00 216 40 145 00 100 00 36 40	Bush. Ib. 351 40 358 20 346 40 320 00 333 20 333 20 300 00 283 20 300 00 283 20 266 40 241 40 241 40 241 40 241 40 241 40 241 40 241 40 241 40 241 40 241 40 241 40 33 20 30 0	Bush. 1b, 48 20 40 00 33 30 55 20 36 40 30 00 36 40 30 40 40 40 48 20 40 40 00 36 40 40 20 00 26 40 40 20 33 20 33 20 13 20 33 20 14 40 16 40 3 20 3 20 3 20 3 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 20 3 3 3 20 3 3 3 20 3 3 3 20 3 3 3 20 3 3 3 20 3 3 3 20 3 3 3 20 3 3 3 20 3 3 3 20 3 3 3 20 3 3 3 20 3 3 3 20 3 3 3 20 3 3 3 20 3 3 3 20 3 3 3 20 3 3 3 20 3 3 3 20 3 3 3 3

POTATOES (IRRIGATED).

The same varieties were tested on irrigated land as on the non-irrigated. They were planted May 18 in freshly broken alfalfa sod that was ploughed just before the rotatoes were put in. Unfortunately, the land was not particularly moist when the planting was done, and as no rains followed the stand secured was most uneven and the resulting yields obtained cannot be entirely depended upon as indicating the relative productivity of the various kinds, as the low yields in some cases were without doubt due to the poor stand. They were irrigated three times, on July 21 and 28, and August 7.

No.	Variety.	Total per s	yield acre.	Yield per acre marketable.		Yield per acre unmarketable.	
1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 12. 21. 22. 23. 24. 25.	Gold Coin. Reeves Rose. Irish Cobbler. Carman No. 1 Factor. Table Talk. Rawlings Kidney (Ash L'eaf Kidney). Dalmeny Beauty. Wee MacGregor. Vick Extra Early. Rochester Rose. Dreer Standard. Morgan Seedling. Green Mountain. Early Ohio. Money Maker. Empire State. Houlton Rose. Late Puritan. Early Hebron (White). American Wonder. Everett. Early Hebron (Pink). New Queen. Early Norther.	119 106 55	1b. 20 00 00 00 00 00 00 00 00 00 00 00 00	Bush. 500 458 455 436 428 408 375 361 373 355 351 286 275 193 175 163 171 133 105 100 55 55 533	1b. 00 00 00 00 00 00 00 00 00 00 00 00 00	Bush. 48 560 40 58 45 445 45 50 31 40 41 35 31 6 21 5 16 6 15 23 8 6 6 14 6	

IRRIGATION OF POTATOES.

As holders of small tracts of irrigated land in the district are beginning to pay considerable attention to the growing of this crop a few suggestions in regard to the

irrigation might not be out of place.

There is perhaps no crop that is so easily injured by poorly timed irrigation, so far as quality is concerned, as is the potato crop. Undoubtedly the criticism that is so often heard that potatoes grown on irrigated land are watery and lack the mealiness of dry land potatoes is often just. This difficulty can be overcome by giving attention to the time and manner of irrigation and to one or two other details. The variety selected is important, for the tubers should be mature, if possible, when dug. For this reason early varieties are desirable but they will not yield as heavily as those not so early. If a medium to late variety, such as the Gold Coin or Wee McGregor is used, it is well to have them planted in good season, preferably not later than May 15. In this connection it would be well to mention that at the Station we have found the Gold Coin an excellent variety, being one of the heaviest yielders of any of the kinds yet tested and a good keeper. LETHBRIDGE.

The land on which potatoes are planted should be as rich as possible so that a rapid growth is obtained. Alfalfa sod gives almost ideal conditions. The first irrigation should be deferred if possible until the plants are in bloom, although they can, and should, be irrigated earlier if the soil becomes dry. This irrigation should be carefully given. A thorough soaking is not desired for it is apt to cause too sudden and rapid growth. It has been found that best results are obtained if the water is allowed to run down every other row only, and the lighter this irrigation is, the better. It is needless to point out that the rows should be so arranged that they are parallel with the slope of the ground so that the water will readily run down between the rows and not flood the tops. This is a distinct disadvantage for it is probably impossible to produce a dry potato if the tops have to be flooded when irrigating.

The second irrigation should follow the first in about 10 days and the third about 10 days after the second. The water should be run between every row at these irrigations. The last irrigation should not be later than the 10th or 12th of August, as an effort should be made to allow the ground to dry and induce the potatoes to mature as much as possible. After the crop has once been irrigated the land should not be allowed to become dry before the next irrigation is given. If, however, for any reason it should become dried out, no later irrigation should be given, for if it is, a new growth is stimulated and the quality of the potato is almost sure to be injured and will be found to be somewhat watery and immature when dug. The idea in irrigating potatoes is that after the first application of water is made the soil should be kept continuously moist, forcing as rapid development as possible and then by stopping irrigating early enough in the season, allow the potatoes to mature before digging time. Usually the first irrigation, depending largely on the character of the season, is given about July 20, the second July 30, and the last August 10. It will be found that it is not wise to dig the potatoes as soon as frost kills the tops, but that they mature considerably if left in the ground till a few weeks later. We believe that it is good practice to allow them to remain as long as it is safe to defer digging.

VEGETABLES.

The following vegetables were all grown on irrigated land:

Beans.—These are usually a rather uncertain crop. It is not well to plant them too early and only extra early varieties should be used. Ten varieties were planted May 20, and three ripened perfectly. These were Extra Early Valentine, Valentine Wax, and Wardwell Kidney Wax.

Beets.—Nine varieties were tested and they all did well. Beets, like all the root crops, are well adapted to our conditions. The Ruby Dulcet gave the heaviest yield.

Cabbage.—Cabbages and cauliflower reach a high state of perfection as they thrive with cool nights on our rich soil. The plants should be started in hot beds and set out the last of May. Twenty-two varieties were tested and all did well. The following appeared to be the best of those tried:—Early crop; Early Jersey Wakefield, Early Paris Market, and Copenhagen Market. Main crop; German Nofalt, Round Empress, Danish Succession, Fottler Improved Brunswick.

Winter crop.—Danish Winter Roundhead and Extra Amager Danish Roundhead.

Cauliflower. Four varieties were grown. The Early Half Long Scarlet did the best.

Celery.—Seven varieties were tested. The seed was sown in the hot bed April 14. Any time during the last few days of May and the first few days of June is probably the 16—51½

Lethbridge.

best time to put them out in the garden. The best ones of these tried were Improved White Plume, Noll Magnificent, Evans Triumph and Giant Pascal. The first named was the earliest.

Corn.—The season proved a particularly favourable one for corn. Ten varieties were tested and they all produced satisfactory ears for table use, but all of them did not mature seed. The earliest was the Squaw, which was ready for use July 30. The Early Malcolm can be recommended as early and good in quality. The Golden Bantam although not always early enough for our season is perhaps the best in quality.

Cucumbers.—Five varieties were tested. Peerless, Prize Pickling and Cool and Crisp can be recommended.

Citrons.—These do best when started in hotbeds, but to transplant successfully the roots should not be disturbed.

Lettuce.—Ten varieties were under test. The first ready for use was Grand Rapids.

Onions.—The safest way to mature onions here is to use Dutch sets but if seed of extra early sorts is sown early in April, a crop is usually obtained. Thirteen varieties were tested and they all produced a good crop, hardening up well. The White Pearl and White Early Barletta were the earliest.

Parsnips.—Two varieties were grown and as usual did well. Any of the standard varieties will be found satisfactory.

Peas.—These are a crop that can always be relied upon. Fifteen varieties were under test. The earliest were the Thomas Laxton and the Gradus. These two varieties are not only quite early but are excellent in quality. For a later sort the Telephone is one that can be recommended for yield and quality.

Radish.—Forcing Turnip Scarlet and Early Scarlet White Tipped were early and satisfactory.

 $Squash\ and\ Marrow.$ —Ten varieties were tested. The Golden and Green Hubbard and the Long White Bush Marrow did well.

Turnips.—Extra Early White Milan and Extra Early White Flat Strap Leaved can be recommended for early use.

Tomatoes.—With tomatoes it is a question of getting the earliest sort available. They have to be started under glass, and should be kept sturdy. Plant out the early part of June or as soon as danger of frost is past.

FRUITS.

STRAWBERRIES.

The results from strawberries have not been as satisfactory as usual. Heavy winds at the time the blooms were setting appeared to injure the crop materially, for although there were as many berries as usual, they were small and many were misshapen.

Twenty-eight varieties were under test. Taking everything into consideration the Senator Dunlap was still as satisfactory as any tried, although the following varieties all yielded slightly in excess of Senator Dunlap; August Luther, Pocomoke, Bismarck, Sample, Minute Man, Williams and Tennessee Prolific.

LETHBRIDGE.

RASPBERRIES.

Of the raspberries under test the Marlboro, Early King, Loudon and Ruby can be recommended as the most satisfactory.

In setting out a patch of raspberries, the rows should be at least 8 feet apart and the plants about two feet apart in the rows. As it is necessary to bend the canes over in the fall and cover completely with earth the rows have to be a good distance apart so that a trench, from which to obtain the earth, can be dug between without disturbing the roots to any great extent. The canes should be kept thinned so that the rows are not over 8 to 10 inches wide. Uncover in the spring as soon as the buds start to swell. We find that unless the plants are covered completely with earth in this way, the canes will either kill back or become so dried out during the winter that they will bear but little, if any, fruit. Do not attempt to use barnyard litter or manure, as a substitute for the earth, as neither is satisfactory. Always keep the patch well cultivated.

CURRANTS.

The yield of fruit from the currants this summer was perhaps the most satisfactory that has been obtained since the plantation was set out. Of the varieties under test the following gave the best yields this year:—Black: Merveille de la Gironde, Bang Up, and Ontario. White: Large White, White Brandenburg and White Grape. Red: Red English and Long Bunched Holland.

APPLES.

We were again successful in raising apples from a number of trees. The amount produced was not so great as last year owing to the fact that excessively heavy winds at the time the trees were in bloom prevented the fruit from setting properly. This emphasizes the need of a good, fairly high windbreak before one can count on any measure of success with apples or for that matter with any kind of fruit. Although the quantity of apples produced was not so great as last year it is encouraging to note that a larger proportion of them were from standard varieties. The trees in the irrigated and non-irrigated orchards yielded about equally well. The following is a list of the varieties that fruited:—

Standard.—Hibernal, Simbirsk No. 9, Grand St. Jean, Yellow Transparent, Charlamoff, Okabena, Stone, Dudley, Duchess, Lowland Raspberry and Patten Greening.

Cross Breds.—Tony, Bow, Jewel, Robin, Pioneer, Silvia, Prince, Norman, Magnus, Kent, and Mecca. These are about the size of ordinary crabs or average a trifle smaller.

Crabs.—Excelsior, Cottage, Dartt, Lyman, Hyslop, Florence, and Transcendent.

ORNAMENTAL GARDENING.

The flowering shrubs made a particularly good showing this year. The lilacs bloomed more freely than ever before. The roses did well. All of the shrubs bloomed that were reported last year and the amount of bloom was as a rule greater.

FLOWERS.

The bulbs came on well, but owing to the dry windy weather early in the spring did not last as long as usual. Annuals: The annuals started in hotbeds and set out bloomed well and lasted till late in the fall. The following are some that did well, and are ones that can usually be depended upon:—Sweet peas, asters, pansies, stocks, verbenas, antirrhinums, larkspurs, petunias. French and African marigolds, phlox, coreopsis, dimorphotheca, scabiosa, zinnias, balsams, alyssum, and nasturtiums. Ten varities of gladioli were tried and did exceptionally well.

A large number of perennials have been started. Every flower lover should endeavour to increase the number of these in his garden for they bloom much earlier than annuals and are easy to raise.

TREES FOR WINDBREAKS.

The question of windbreaks is such an important one that suggestions in this connection cannot be repeated too often. The trees that have been used most extensively at the Station, and the ones that seem to be the most satisfactory, are the native cottonwood and the sharp-leaved, laurel-leaved and golden willow. The last one is perhaps not quite so hardy as the two former, but grows a trifle faster. The caragana does not grow so tall but is absolutely hardy, and is ornamental. There are also a number of hardy Russian poplars that could be mentioned.

There are just two essentials to the successful growing of trees under our conditions: the land should be deeply ploughed and summer-fallowed the previous year, and after the trees are set out they should be kept cultivated carefully all summer. Trees cannot be successfully grown among grass and weeds.

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

The spring and summer of 1914 were favourable for the production of vegetables and fruits of good quality. The latest spring frost occurred on May 29, but was not heavy and did not injure fruit blossoms. The earliest fall frost came on September 1. The precipitation for the growing months from April to August inclusive was 9.905 inches. Trees in the arboretum made good growth, ripened up their wood well and came through the winter in good condition.

Less injury from wind was experienced in the garden during the past season than in previous years. The growth of windbreaks will doubtless further reduce this injury each season.

ORCHARD.

For the second year in succession the orchard produced a small quantity of cross-bred apples from the following varieties: Charles, Progress, Prince and Eve, while the following produced fruit for the first time: Aurora, Jewel, Robin and Pioneer.

This fruit is fine in texture and of fair flavour. The quality of the jelly made from these apples is superior.

There are approximately 6,000 apple seedlings in the orchard from the following varieties: 70 August, 430 Anisim, 220 Antonovka, 415 Baraboo, 140 Charlamoff, 1,135 Hoadley, 720 Iowa Beauty, 295 Moscow Pear, 870 Anis, 90 Anis Rose, 65 Blushed Calville, 80 Bogdanoff, 165 Grandmother, 350 Hibernal, 90 Lowland Raspberry, 650 Patten Duchess, 130 Un-named.

Many of these seedlings give promise of producing trees both hardy and of fair type, and it is hoped that fruit of good quality may be obtained from a fair percentage of them. The fact that a number of cross-bred apple trees have wintered successfully for several years is evidence that hardy sorts of standard apples may be obtained through persevering efforts.

PLUMS AND CHERRIES.

No success has yet been achieved in the growing of plum or cherry trees, even seedling plum trees secured from Manitoba have not wintered, and it is evident that the climate is particularly trying on this class of tree growth.

SMALL FRUITS.

CURRANTS.

The bushes in the new plantation of currants made satisfactory growth, and should be of sufficient size to produce quite a quantity of fruit in 1915. Herewith is given a table showing the standing of varieties of red, white, and black currants as determined by the production of fruit during the past four years. The yield is taken

from three bushes of each variety, and as the bushes are 6 feet apart in the row and the rows 6 feet apart the yield per acre may be computed on the figures given:—

		1	1	1	1
Variety.	1911.	1912.	1913.	1914.	Average.
Black Currants. Climax Ontario. Winona Saunders. Ethel. Topsy Success. Magnus. Bang Up. Ogden. Eclipse. Kerry. Eagle. Merveille de la Gironde. Norton. Beauty. Monarch Lee Prolific. Red Currants.	1b. oz. 8 6 6 10 0 0 4 13 8 7 11½ 6 15 16 10 10 10 10 10 10 10 10 10 10 10 10 10	1b. oz. 19 14 16 13 12 6' 20 8 10 5 14 10 10 3 20 1 13 0 7 13 9 4 19 12 21 14 23 3 15 9 12 26 14 18 4	lb. oz. 4 4 4 4 4 8 1 8 6 5 11 8 6 6 5 11 8 17 0 14 18 17 0 14 18 2 4 12 27 0 17 0 30 12 28 8 31 4	1b. oz. 1 2 4 6 0 4 1 9 1 14 0 9 	1b. oz. 8 6\frac{1}{2} 8 14\frac{1}{4} 4 13\frac{1}{2} 10 8 7 9\frac{1}{2} 10 17\frac{1}{2} 11 6 10 10\frac{1}{2} 12 13 10 10 10 10 10 10 10
Cumber and Red. Victoria Frauendorfer Red English Red Dutch Prince Albert Rankins Red Fay Prolifie Champagne Red La Conde Benwell Wilder Red Dutch (new) Pomona Long Bunched Holland Raby Castle Moore Seedling Early Scarlet Red Grape. Large Red Wentworth Levisthan	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	10 4 17 8 4 0 10 4 24 12½ 6 9 13 13 6 6 11 10 11 7 11 0 13 15 7 8 16 12 7 6 2 10 4 1 10 15 6 3	5 8 2 5	3 8 1 2	5 2 6 3 5 94 5 13 21 7 11 8 5 9 3 15 8 14 8 14 6 13 15 8 6 6 6 4 6 5 4 6 2 5 4
White Grape	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	12 14 2 3 1 7 0 15 3 3 1 5 5 3 10 15 11 4	9 8 1 3 5 1 2 14 0 12 2 0 2 10 5 9 15 0	6 6 11 0 4 16 1	7 9 1 5 0 8 2 6 3 8 1 1 1 2 2 11 6 0 10 1

GOOSEBERRIES,

It has been found necessary to cover gooseberry bushes completely with earth if they are to winter successfully. Various other methods of providing winter protection have been tried but without success. The first fruit to be secured was obtained in 1914, following the covering of the bushes with earth during the winter of 1913-14. The varieties Richland and Carrie produced a small quantity of fruit. In 1915 it is proposed to increase the number of varieties of gooseberries under test.

RASPBERRIES.

A very satisfactory yield of raspberries was secured in 1914. The yield shown in the table is from an area 36 by 6 feet, and as the highest yielding variety produced 243 pounds it will be seen that the yield per acre is 4,974 pounds for that variety:—

Variety.	Yield for 1914.	Average yield for 4 years.
Loudon Early King Sarah Shaffer Colossal Herbert Golden Queen Sunbeam. Cuthbert.	lb. oz. 21 8½ 22 5½ 24 12 1 11 8 7 8 3 4 15	lb. oz. 7 13 11 11 12 7 0 9 9 13½ 4 5 5 3 4 15

STRAWDERRIES.

Difficulty has been experienced in getting a good stand of plants. From our experience during the last few years we are led to believe that it may prove advisable to defer transplanting till towards the end of May, or until the rainy season opens. The dry windy weather, so common early in May, renders it difficult to get the young plants to root uniformly. A second difficulty has been met in rooting the runners in the fall. Again, at this season of the year the weather is usually dry and occasionally windy and frequently the plants are blown about to such an extent that a callus is formed where the young roots should be thrown out. This condition is best offset by fastening the runners down at the point where the young plant is developing, with a forked branch of a willow, or with a wire staple such as is used for fencing.

A new plantation of strawberries was planted for fruiting in 1915. A light yield of fruit was secured from the following everbearing varieties: Model, Americus, Progressive, Iowa.

VEGETABLES

BEANS.

A fair yield of wax beans was secured in 1914, and the following table will show the yield during the past season as well as the average for four years of the varieties named in the table. Seed was sown in the open on May 20, and the yields given are from one row 30 feet long:—

Variety.	Ready for Use.	1914.	Average for 4 years.
Wardwell Kidney Wax. Valentine Wax. Early Refugee. New White Stringless Green Pod. Refugee or 1000 to 1. Keeney Rustless Golden Wax. Bountiful Green Bush. Grennell Rustless Wax.	" 27	9 8 10 4 11 15 14 14 12 0 8 8 15 14 14 4	1b. oz. 9 14 13 7 15 9½ 13 1 8 3 12 8 29 10 14 4

BEETS.

Ten varieties of beets were sown in the open on May 6, in rows 30 feet in length. The varieties first ready for use were Ruby Dulcet and Early Blood Red Turnip. These varieties were also of satisfactory quality. The following table shows the yield for the past four years as well as the average for that period:—

Váriety.		.1.	191	12.	19	13.	19	14.	Ave	rage.
Ruby Dulcet Black Red Ball Early Blood Red Turnip. Egyptian Dark Red Flat. Eclipse. Klein Rabbelghe. Egyptian Meteor. Cardinal Globe. Danish Blood Turnip.	11 55 10 60 43	0z. 8 0 0 8 12 0 0 8	15	OZ. 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	62	2	1b. 114 79 96 76 117 28 108 29 12	oz. 8 8 0 0 9	1b. 59 41 71 44 74 10 44 57 29 12	oz. 13½ 12 0 1 1 0 0 2½ 0 0 0 0

CABBAGE.

The yield of cabbage in 1913 was the greatest on record, but the yield of 1914 rather closely approaches the record figures. The table given herewith gives the yield of the varieties tested during the past four years and the average yield for those varieties under test for that length of time:—

Cabbage.	1911.	1912.	1913.	1914.	Average.	
Early Jersey Wakefield Large Late Flat Drumhead Extra Early Midsummer Savoy Lubeck Magdeburg Small Erfurt Winningstadt Danish Ballhead Danish Ballhead Danish Ballhead Flat Swedish Imp. Amager Danish Roundhead Extra Amager Danish Ballhead Copenhagen Market Early Paris Market Fottler Improved Brunswick German Nofatt Round Express Danish Succession Danish Winter Roundhead Red Cabbage,	31 0 12 0 34 0 43 .0 56 0 68 0 104 0 103 0 89 0 88 0	56 0		78 1 122 6 63 11 104 2 96 5 49 12 99 14 90 0 116 0 118 14 92 7 181 9 77 12 154 7 145 10 153 11 121 3 93 3	73 9 98 4 43 11 72 8 965 9 65 9 83 3 56 0 109 4 96 11 137 14 74 9 80 13 145 10 153 11 121 3 93 3	
Danish Stonehead. Danish Delicatesse Danish Stonehead (Roundhead)		12 0 8 0	19 0 50 0	73 10 66 5 53 5	33 9 41 7 53 5	

CELERY.

Seed was sown in the hotbed April 2, pricked into the cold frame May 23, and re-set June 6. The quality was not very good. The following table shows the yield for the past four years, as well as the average for that period:—

Variety.	1911. 1912		12.	193	13.`	1914 .		1914 .		Ave	rage.
White Plume Paris Golden Yellow Giant Pascal Evans Triumph Noll Magnificent French Success Improved White Plume Rose Ribbed Paris	18 14	OZ.	16 43 37 34 37 	Oz.	1b. 21 19 35 38 37 31	OZ. 0 0 0 0 0 0 0 0 0 0	1b. 29 14 33 44 40 24 12	oz. 0 8 0 0 8	lb. 25 13 33 34 32 26 12 22	oz. 0 10 0 0 6 8 8 11	

CAULIFLOWER.

The variety of cauliflower first ready for use was Earliest Dwarf Erfurt which came in August 8. Of the three varieties under test the yield places them in the following order: Danish Giant Dry Weather, Earliest Dwarf Erfurt and Earliest Dwarf Snowball No. 24.

CARROTS.

Seed was sown in the open on April 10, and the variety Improved Nantes was ready for use on the first of August. The rows were 30 feet in length and the figures submitted give the yield for one row of each variety:—

•	Variety.			ld in 14.
Improved Nantes	arlet	,	1b. 72 107 35 27 30 28	0z. 8 , 4 0 8 4 0

CORN.

The season of 1914 was favourable for the production of corn. Seed of the following varieties was planted on May 6; Early Iowa, Metropolitan, Perkins Extra Early Market, Early Fordhook, Squaw, Pocahontas, Early Dawn, Golden Bantam, Early Malcolm.

Of the above varieties the following three produced corn fit for table: Early Dawn, Early Malcolm and Squaw. Only the latter variety ripened seed.

LETTUCE.

The following varieties were tested in 1914: Red Edged Victoria, Dark Green Capucine, Giant Crystal Head, Hanson Improved, Iccherg, Unrivalled Summer. Rousseau Bloude Winter, Grand Rapids, Black Seeded Simpson, All Heart.

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For the past season, for earliness and quality, these varieties would rank as follows: All Heart, Iceberg, Black Seeded Simpson, Unrivalled Summer, Giant Crystal Head.

ONIONS.

The following varieties of onions were tested in 1914: Red Australian Brown, Early Flat Red, White Queen, Very White Pearl, Great Red Wethersfield, Red Globe, White Early Barletta, Dark Red Beauty, Extra Early Red, White Globe, Yellow Globe, Danvers Yellow Globe, Large Red Wethersfield.

The standing of these varieties in the matter of yield and in maturity at harvest time is as follows: Large Red Wethersfield, Yellow Globe, Red Globe, Danvers Yellow Globe, Great Red Wethersfield.

PARSNIPS.

Two varieties of parsnips were tested, the Intermediate and Improved Hollow Crown. The latter variety gave the highest yield, producing fifty pounds from one row 30 feet in length.

PEAS.

A splendid crop of peas was produced in 1914. The quality was as usual very good indeed and the season long. Seed was sown in the open on the 21st of April, and the yield as given is from a row 30 feet in length. The table gives a yield as far as possible of every year since 1911, together with the average of the four years of those varieties tested for that length of time:—

Variety.	1911.	1912.	1913.	1914.	Average.	
Dainty Duchess. Gradus Excelsior. Quite Content. Advancer, McLean. American Wonder Premium Gem Heroine. Lincoln. Juno. Stratagem Telephone. Gregory Surprise. Early Glant. Nott New Perfection.	5 14 12 3 15 10 12 7 12 7 16 8 24 11 18 0 19 0	22 1 12 14 22 4 19 10 20, 11 9 8 - 19 15 3 10 19 7 18 16 14 0	16 4 12 10 0 16 0 19 14 20 14 15 8 8 19 2 12 10 18 3	lb. oz. 28 4 28 14 23 12 16 14 25 15 24 10 24 4 41 12 22 13 43 8 23 13 28 9 30 3 33 3 8	28 4 18 4 15 14 16 14 18 7 28 5½ 19 5 22 2½ 22 13 26 15½ 13 8 18 2 17 14 17 15¾	

PARSLEY.

Of the two varieties tested, Double Curled and Dwarf Perfection, the latter was the superior.

PENNYROYAL.

Seed was sown on the 20th of June which proved too late as maturity was not reached before frost.

PUMPKIN.

Two varieties were tested, Early Sugar and Connecticut Field. The largest pumpkins produced were ten and twelve pounds respectively though one plant carried through in the hot bed produced fruit weighing practically twenty pounds.

RADISH.

Two varieties were tested, the Turnip Early Scarlet White Tipped and Forcing Turnip Scarlet, both of which gave a satisfactory yield, were ready for use at the same time and were about of equal quality.

RHUBARB.

The varieties of rhubarb of highest quality were: Victoria, Linnæus, Early Raspberry, Early Scarlet.

The following table shows the varieties tested, the date in use and the total yield from three hills of each variety:—

Variety.	Ready for Use.	Yield.
Early Raspberry Victoria Daws Champion. Paragon. Linnaeus. Prima Donna Early Scarlet. Royal Albert. Monarque. Tolbosk.	June 22 " 25 " 24 " 25 " 25 " 24 " 25 " 28 " 30 " 30 " 30 July 1	lb. oz. 88 4 78 8 68 4 68 0 61 0 60 8 56 0 46 1 38 0 36 8 55 0

TURNIPS.

Of the three varieties of turnips tested in 1914 Early White Flat Strap Leaved gave the largest yield, producing one hundred pounds from a row 30 feet in length. The Variety Favorite followed, with Extra Early White Milan third.

TOMATOES.

Ten varieties of tomatoes were tested. No fruit was fully matured. Those varieties producing the largest green tomatoes are arranged in order: Prosperity, Bonny Best, Earliana, Chalk Early Jewel, XXX Earliest Round Scarlet Skin, Extremely Early I.X.L., Northern Adirondack, Alacrity.

VEGETABLE MARROW.

Several varieties of vegetable marrow produced fruit. The largest total production from three hills was secured from the variety Long Vegetable Marrow (cream trailing) which produced 139 pounds, Long White Bush Marrow producing 112 pounds while several varieties of squash produced fruit, among them being Mammoth Whale, Hubbard and Golden Hubbard.

POTATOES.

Thirty varieties of potatoes were tested at this Station in 1914. The land was ploughed out of timothy and alsike sod in August of 1913, packed, disced and thoroughly worked throughout the fall. Early spring cultivation was given and the potatoes were planted on May 23 and 25 and harvested September 21 and 22.

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An experiment was conducted with sprouted versus un-sprouted sets. The sets were placed in a box and exposed to the sunlight about ten days before planting. The sprouted sets appeared above the ground and came in bloom one week earlier and continued to show superior vigour and growth throughout the entire season. The yield from the sprouted sets excelled that secured from the unsprouted by more than 50 per cent.

POTATOES—Test of Varieties.

Variety.	Dat Plant		Date Harvest'd				Tot Yie per a	ld	Percentage marketable.	Percent - age non- market- able.	Form and Colour.
Morgan Seedling King Edward		23 . 25	Sept.	21 22	Bush. 365 363	lb.	98 63	2 37	Long, pink. Half round, white,		
Irish Cobbler Money Maker Table Talk Epicure Late Puritan Wee McGregor Empire State	64 6 64 6 64 6 65 6 66 6	23 23 25 25 23	66 66 66 66 66	21 21 22 22 21 21	360 360 354 349 343 325 323	48 48 12 48 12 36 24	80 82 50 90 89 91	20 18 50 10 11 9	pink eye. Round, white. Long, white. Round, white. Round, white. Half Long, white. Round, white. Long, white.		
Gold Coin American Wonder Rawlings Kidney (Ashleaf Kidney). Carman No. 1. British Queen. Selected Table Talk. Early Norther	46 CC	23	66 66 66 66 66	21 21 21 21 22 22	314 308 305 286 286 286 275	36 00 48 00 00 00 00	76 90 87 82 81 65 94	24 10 13 18 19 35 6	Half round, white. Half long, white. Round, white. Half long, white. Half long, white. Round, white.		
Darer Standard. S. African Frost Proof. King. Rochester Rose. Houlton Rose. Holborn Abundance. Country Gentleman.	11	23	44 44 44 44	21	255 250 248 248 224 224	12 48 36 36 24 14	85 81 89 42 85 80 74	15 19 11 - 58 15 20	Half long, red. Half round, white. Half long, red. Half long, white. Half round, pink. Round, white.		
Early Hebron. Hard to Beat. New Queen Dalmeny Beauty. Vick Extra Early.	" 2 " 2 " 2	25 23 25 23 25	«« «« «« ««	22	211 182 158 143 112	12 24 24 00 12	76 64 82 76 72	24 36 18 24	Half long, pink. Half long, pink. Half long, white. Half round, pink. Half long, white. Round, white.		

FLOWERS.

The following herbaceous perennials have lived through two winters and in nearly every instance have produced bloom:—

Aconitum Napellus albus. Aconitum Napellus.
Aconitum Lycotonum. Aconitum Sparks (variety). Aconitum Stoerkianum. Anchusa italica (Dropmore variety). Aquilegia (in variety).

Aquilegia (in variety).

Dictamnus albus.

Dictamnus albus purpurens (Fraxinella). Dictamnus caucasica. Dicentra spectabilis. Dianthus deltoides glaucus. Dianthus barbatus. Dracocephalum Ruyschianum. Delphinium (in variety).
Delphinium cashmirianum. Geranium sanguineum. Gypsophila Paniculata. Gailla dia. Campanula (8 varieties). Cimicifuga americana. Helianthus Daniel Dewar. Helianthus Miss Mellish. Helianthus giganteus. Hemerocallis Gold Dust. Hesperis matronalis.

Lupines. Lathyrus albus. Papaver nudicaule miniatum. Phalaris arundinacea, Platycodon grandiflorum, Papaver orientale Mogul. Papaver orientale Queen Alexandra. Polemonium (4 varieties). Pyrethrum. Phlox Mrs. Jenkins. Spirwa astilboides. Spirwa Filipendula. Spiraa Ulmaria. Spirwa Venusta. Spirwa Aruncus. Thalictrum (4 varieties). Veronica spicata.
Veronica Waldsteinii. Japanese Iris. Iris sibirica. Iris sibirica Snow Queen. German Iris Honorabilis. " Spectabilis.
" Lord Salisbury. " Madame Chereau.
" Edith.
" La Tendresse. 66 61 4.6

CANNAS.

A collection of partly grown cannas was received on June 16. The weather was not very favourable to their growth and no bloom was obtained.

ANNUALS.

The following varieties of annuals were sown in the hotbed on April 22:--

		Broom	MED	
	Fr	om	Т	0
				-
sters, 21 varieties	Aug.	16	Oct.	2
lyssum, Sweet	July	20	66	2
ntirrhinum	Aug.	241.	66	2
artonia aurea	July	25	66	2
andytuft	1.	8	Nov.	
arnation, Marguerite	Aug.	25	Oct.	2
entranthus Mucrosiphon	July	3	"	
hrysanthemum, annual	66	25	66	1
Tarkia elegans	Aug.	12	46	Î
ockscomb	is the same	22.	Sept.	
oreopsis, annual, 6 varietics	**	15	Oct.	
Cosmea or Cosmos.	July	15	Aug.	1
Pianthus Heddewiggii	\uu.	3	Oct.	
	July	8	66	•
	Aug.	10	66	
Paisy, double	July.	25	66	
Sehscholtzia		14	66	
odetia	Aug.	17	- 66	1
acobaea		3	66	1
avatera rosea	6.	22	66	1
arkspur, 3 varieties				
eptosiphon hybridus	July	12		,
inum		28		
obelia ramosa		22	44	
rench Marigold		17.,	"	
Iignonette	Aug.	5	1]
Tasturtium, 8 varieties	July	23	Sept.	
etunia, 4 varieties	Aug.	14		
Phlox Drummondii, 7 varieties	July	25	Oct.	1
Portulaca	66	25	Sept.	
Rudbeckia	1	31	66	
alvia Fireball	- 66	21	44	
alpiglossis	66	18	46	
cabious.	Aug.	17	66	1
chizanthus hybrids	July	12	44	
tocks, Ten Week, 6 varieties	**	24	Oct.	- 1
wan River Daisy	64	25	66	
weet Sultan	Aug.	3	44	
erbena.	66	18	46	
Viscaria cardinalis	July	17	66	1

The following varieties of Everlasting were tested:-

	Bro	OMED
	From	То
Acrolinium Anymobium Calendula Helichrysum Xarantnemum Zinnia	July 8 " 17 " 23 " 25 July 29 " 24	" 10 " 21

The following varieties of foliage plants were tested with good results: Kochia trichophylla, Pyrethrum aureum, Amaranthus tricolor splendens, Zea japonica variegata.

Fifty-four varieties of sweet peas were planted on April 14. The first bloom appeared July 8 and from that date to the close of the season there was a splendid profusion and variety of bloom. The sweet pea is one of the very best flowers for this climate:—

King Edward VII, crimson,
Doi othy Eckford, white self.
Dainty, white edged pink.
Black Knight, dark maroon.
Miss Wilmott, salmon red.,
Mrs. Walter Wright, rosy mauve.
Mrs. Collier, primrose self.
Helen Pierce, grained blue.
Prince of Wales, rosy crimson.
Lord Nelson, dark blue.
Lady Grisel Hamilton, lavender self.
Janet Scott.
Zarina, salmon pink.
Jeannie Gordon, carmine and buff.
Prima Donna, blush pink.
Rose du Barri, rose and orange,
Queen Alexandra, crimson scarlet.
Saint George, orange scarlet.
Charles Foster, pink and mauve.
Asta Ohn, lavender.
America Spencer, rosy scarlet.
Mrs. A. Ireland, rose and blush.
John Ingman, carmine and rose.
Mrs. Hardcastle Sykes, blush pink.
Mrs. Routzahn, apricot cream.
Helen Lewis, orange scarlet.
Nora Unwin, white self.
Nublan, dark maroon,

Flora Norton Spencer, pale blue. Countess Spencer, pale pink, Elsie Herbert, white. Mrs. Cuthbertson, bicolour. Clara Curtiss, primrose self. Lady Evelyn Eyre, pink flushed sal-Florence Nightingale, lavender. Mrs. C. W. Breadmore, primrose. Etta Dyke, white self. Tennant Spencer, rosy mauve. Thomas Stevenson, orange scarlet. Maud Holmes, crimson. Mrs. R. Hallam, pink cream. Rosabelle, rose self. Hercules, rosy pink.

Moonstone, pale lavender grey.

Helen Chetwynd Stapylton, pink on cream. Princess Mary, b'ue, slight pink. Edith Taylor, salmon rose. Lilian, pink flushed buff. Cerise Spencer, cerise. Barbara, salmon orange. Agricola, lilac blush. Scarlet Emperor, scarlet se'f. Zarina Spencer, salmon pink.

King White, white.

GLADIOLI.

The following varieties of gladioli were planted on the 21st of May and in the majority of cases produced bloom. The season did not permit bloom to continue any length of time as it was frosted September 15. The variety Pink Beauty came earliest into bloom, flowering the 2nd of August: America, Halley, Pink Beauty, Hollandia, Joseph Hulot, Willy Wigman.

PÆONIES.

Twenty-one varieties of pæonies received from A. Dessert, Chenonceaux, France, were planted on the 3rd of November, 1913. The following bloomed last year: Festiva Maxima, Madame Emile Galle, Livingstone, Octave Demay.

TULIPS.

Tulips made a brilliant showing in 1914:-

· Variety.	Height.	In Bloom
•	In.	
Artus Cottage Maid Chryslora Duchesse de Parma Joost van Vondel (red in white) Joost van Vondel (white) Keizerskroon La Reine Pottebakker (scarlet) Pottebakker (white) Proserpine Vermilion Brilliant	7 8 9 8 9 10 11 10 10 10 10 10 8	May 21. " 19. " 19. " 19. " 19. " 18. " 20. " 20. " 15. " 17. " 19.
EARLY DOULES. Couronnte d'Or. Impera or. Murillo. Rubrorum. Late Singles.	10 9 9 9	May 19. "19. "20. "19.
Darwins. Gesneriana Spathulata Isabella. La Merveille La Candeur Picotee. Yellow Rose.	8	May 29. " 30. " 28. " 29. June 1. " 6. " 1.

DAFFODILS.

	Varieties.	In Bloom
Sarri Conspicuus		May 29.
Imperor		. " 29. " 29. " 29.
oeticus Princeps		. " 29

A number of ornamental trees and shrubs were planted in different parts of the grounds in the spring of 1914. This planting is now practically complete and the growth already made is greatly improving the appearance of the farm. The bareness of the ground between the Edmonton trail and the Superintendent's residence is disappearing and in a very short time this area will present a changed appearance to that of two or three years ago. A large number of hedges are now being grown with the object of providing material for comparison so that farmers wishing to add beauty to their grounds may be able to select intelligently the varieties of trees suitable for hedge purposes which they consider would meet their conditions best. The hedges of greatest promise at present are: laurel-leaved willow, caragana arborescens, native white spruce, salix daphnoides acutifolia.

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

The horticultural work was started rather late this spring, as from October 1913, until April, 1914, we did not have anyone in charge of this particular branch of our work.

Early in April, Mr. J. D. Brydon was engaged, and he took charge of the work during the season. The following report contains the results which were obtained by him.

The main work of the season consisted of a somewhat extensive series of variety tests with vegetables, flowers and bush fruits,

The season was a very dry one, and some varieties of fruits, flowers, and vegetables suffered in consequence. However, fair returns were secured as a rule, and dry weather loving plants did better than usual.

During the spring and early summer months, there was a good show of bloom in the herbaceous border, but during July and August many plants did not come to perfection.

The orchard planted in the spring of 1913 has got well established, but only some of the small fruits produced a crop this year.

The winter of 1914-15 up to date of writing has been one of the mildest on record. There has been no snow, and the rainfall has been exceptionally light. Consequently everything is very early. Snowdrops and crocus bloomed as early as the first week in February, and the daffodils, hyacinths, and some of the earlier varieties of tulips were making a splendid show by the third week in March. Flowering cherry, magnolia, and crab apple were also in bloom.

The fine weather enabled a lot of work to be done during the winter, which in ordinary years would have to be left until the spring. This, of course, enables us to give more time and attention to the rest of the work in the garden at the present, when time is so valuable, and given a reasonably fine summer the season promises to be one of the best in the history of the Farm.

PEAS

Variety.	Date Sown.	Height.	Date ready for use.	Yield per plot Green Peas in pod.	Yield per acre.
Juno Dainty Duchess. Gregory Surprise. Thos. Laxton. Stratagem. American Wonder Sutton Excelsior. McLean Advancer Gradus. Telephone Premium Gem. Heroine. The Lincoln. Quite Content.	April 9 " 9 " 9 " 9 " 9 " 9 " 9 " 9 " 9 " 9 " 9 " 9 " 9 " 9 " 9	3 6 5 6 5 6 2 0 0 2 6 0 7 0 1 5 3 6 2 8	July 9 " 1 June 14 " 17 " 26 " 20 " 20 " 17 July 1 June 29 July 9 July 9 July 9 July 9 July 9 July 9	1b. 32 20 20 19 19 18½ 16 15 14½ 12 12 12 12 7 ation.	ton. cwt. lb 7 14 88 4 16 80 4 16 80 4 11 96 4 11 96 4 9 54 3 17 44 3 12 60 3 10 38 2 18 08 2 18 08 2 5 98 1 13 88

Fourteen varieties of peas were tried this year, all of them except Quite Content being sown on April 9. This latter gave no results at all, only three or four of the seeds germinating. Juno came out on top in the matter of yield, giving considerably over seven tons to the acre. This was one of the last to come into bearing, and had well filled pods of good, dark green peas.

Gregory Surprise and Dainty Duchess tied for second place, with a yield of about 5 tons to the acre. The latter is a good pea, but the seed was mixed with a taller variety with small peas, which affected the yield to a certain extent. The former, as was the case last year, was the first to come into bearing, and yielded well on into the season. Stratagem, Thos. Laxton and American Wonder gave fair results, but American Wonder did not compare favourably with the others in point of flavour.

ONIONS.

Variety.	Date Sown.	Date Harvested.	Yield per Plot.
Salzer Great Red. Large Red Wethersfield. Red Globe. Danvers Yellow Globe.	" 11 " 11 " 11 " 11	Oct. 15	lb. oz. 12 3 8 5 7 3 6 6 6 0 4 3 4 0

Owing to the very dry season and the seed being sown late on rather poor soil, they did not start as well as they might have done.

At the thinning season they were very badly troubled with the maggot, and it was not considered advisable to thin them. They were dressed twice with coal oil and sand in the growing season, in order to check the depredations of the maggot as far as possible, and this remedy had considerable effect. While these did not give the best results as regards yield, we would mention Red Globe, and Red Wethersfield as two very useful varieties of onion, being more uniform in shape and size than the others. Yellow Globe is a good early variety, but does not recommend itself as a good keeper. White Globe is an excellent onion for pickling.

CORN.

	Date own.	Hei	ght.	Date ready for use.	Yield per plot of Green Corn on Cob.		Yield Acı	
Perkins Extra Early Market Apr Metropolitan	20 20 20 y 18 il 20 20 20 20 20 20	ft. 8 7 7 6 6 7 4 5 5 7 5 3	in. 0 6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Aug. 20 Sept. 5 " 3 " 3 Aug. 27 " 20 Sept. 6 Aug. 12 " 10 " 14 Sept. 2 " 16 " 6	40 38	ton. 16 13 13 12 12 11 11 10 10 9 9 9 8	18 11 11 12 12 17 17 3 13 13 13	80 04 36 68 00 32 48 80 28 60 16 92 24

Fifteen varieties of corn were tested and owing to the exceptionally dry season they matured very early, the Squaw corn coming in as early as the 6th August, and most of the other varieties were fit for use before the end of that month. Perkins Extra Early Market proved the heaviest cropper with a yield of nearly 17 tons to the acre. This is a very strong growing corn with large cobs, and comes in fairly early, but does not compare very favourably with several other varieties as regards flavour. Metropolitan came second, and is hard to beat for flavour and yielding qualities combined, though Golden Bantam as usual, takes first place for the former quality. Mexican Black, as its name implies, when properly ripe is black, and as it is of a very sweet flavour is a rather popular variety, apart from the interest attaching to it from its peculiar colour. Country Gentleman is another corn that can be recommended for its table qualities.

TOMATOES.

Variety.	Date sown.	Date ready for use.	Weight of five average hills.	Yield per acre,
Florida Special Burpee Whole Salad Chalk Early Jewel Prosperity Sunnybrook Strain Earliana Alacrity Rennie XXX Bonny Best Johnston Jack Rose LX.L Northern Adirondack	March 30	" 15 " 12 " 7	lb. oz. 53 8 44 0 43 8 41 0 36 7 33 0 30 3 26 12 24 8 22 8	tons cwt. lb. 14

This test included eleven varieties, which were all sown on 30th March in a hotbed, and from there transplanted as they were ready into 2 inch. 4 inch. and 7 inch. pots, and from the latter transferred into the garden.

They were grown on the one stem system, staked, kept reasonably pruned, and the weights were obtained from five average plants.

Florida Special was the heaviest cropper, but this yields a rather coarse fruit, with a very large deep eye. Burpee Whole Salad came second, and this was by far the best tomato in the trials. It is a heavy bearer of well shaped, firm and fleshy tomatoes with the joints very close, and is a variety that should be grown more extensively, being well adapted to the climate in that it does not seem so liable to rot as do many of the other kinds when the weather is damp. Chalk Early Jewel and Prosperity also yielded well, but the former does not adapt itself well to the climate, as it commences to rot before the fruit is ripe, and half the fruit has to be cut away before it can be used.

BEETS.

Variety.	Date Sown.	Date ready for Use.	Yield per Plot.	Yield per Acre.
Cardinal Globe Early Blood Red. Eolipse Egyptian Dark Red Flat. New Meteor. Ruby Dulest. New Black Ball.	" 15 " 15 " 15	{ " 20	1b. 54 36 36 35 35 33 29	ton. ewt. lb. 15 13 74 10 9 16 10 9 16 10 3 35 10 3 35 9 11 73 8 8 49

Out of the seven varieties of beet which were tried Cardinal Globe stands out from the rest both for quality and yield. It has a nice clean skin, and the roots are of good uniform shape. It could do with a little selecting. Early Blood Red and Eclipse tied for second place in point of yield, but of these two Early Blood Red was easily the better. Eclipse being very coarse, and, in fact, the poorest beet in the trials as regards quality. The seed both of Ruby Dulcet and New Black Ball was not true to type, some of the leaves being green, and some red.

CARROTS.

Variety.	Date Sown.	Date ready for Use.	Yield per Plot.	Yield per Acre.
Nantes Early Half Long Scarlet	April 9	July 10 " 10	lb. 82 68	tons cwt. lb. 23 16 42 19 15 08

Only two varieties of carrot were tested this year, and both gave very good results. They were first ready for use on the 10th July, and the last of them were harvested on the 15th October. Nantes Early Half Long Scarlet came first with an exceptionally heavy yield of nearly 24 tons to the acre. Both varieties were good table carrots.

BEANS.

Variety	Date Sown.	Date Ready for Use.	Yield per plot of Green Beans.	Yield per acre.
Grennell Rustless Wax. Extra Early Refuge Refugee or 1,000 to 1. Wardwell Kidney Wax. Golden Wax. Bountiful Green Bush New White Seeded Stringless Green Pod. Valentine Wax Extra Early Valentine.	" 7 " 7 " 7 " 7 " 7	" 10 " 7 " 17 " 13 " 16	18 17½ 15 15 15	tons ewt. lb. 5 13 30 5 4 58 5 4 58 5 1 68 4 7 15 4 7 15 3 9 72 3 6 82 2 12 29

Four green and three wax varieties of beans were grown, and of these Grennell Rustless Wax was the best, not only being the heaviest cropper, but maturing quickly. It also gave the best satisfaction for table use. Extra Early Refuge, Refugee or 1,000 to 1, and Wardwell Kidney Wax also did well. The beans were planted in rows 30 inches apart, and plants were two inches apart in the rows.

LETTUCE.

Variety.	Date Sown.	Date ready for for Use.	Yield per Plot.
Drumhead Wonder. Dark Green Capacine. Grand Rapids. Simpson Black Seeded. Iceberg. Giant Crystal Head. Hanson Improved. Unrivalled Summer. Dreer All Heart. Russian Blond Winter. Red Edged Victoria.	" 7 " 7 " 7 " 7	" 10 " 4 " 4 " 9 " 10 " 6 " 10 " 10 " 28	$\begin{array}{c} 35\\ 30\\ 22\frac{1}{2}\\ 22\frac{1}{2} \end{array}$

Of the eleven varieties of lettuce tested two were practically a total failure, bolting to seed as soon as ready. These were Russian Blond Winter and Red Edged Victoria. On account of the dry season the lettuce was late in maturing, not being ready before July 4. Drumhead Wonder was at the head of the list, and is one of the best lettuce, being a good size, with a nice firm heart. Giant Green Capucine came second, and is a cos variety with dark green foliage. It is rather inclined to throw its inside leaves out instead of closing.

Grand Rapids yielded well, but did not make a very good heart. Iceberg is a small variety that can be well recommended.

RADISH.

Variety.	Date sown.	Date ready for use.	Yield per plot.
Forcing Turnip Scarlet Early Scarlet White Tip.	June 12 " 12	July 5	1b.: 11 9

Only two varieties of radish were tried, and there was very little difference either in the yield or the time taken to mature. The maggot is very prevalent in this district, and as an experiment one variety was sown under cheesecloth and the other in the open. Either owing to the drought or to the late planting the maggot gave very little trouble, but the variety under cover yielded a slightly heavier crop.

TURNIPS.

Variety.	Date sown.	Date ready for use.	Yield per plot.	Yield per acre.
Extra Early White Milan Early White Flat Strap Leaved	June 12	July 20 " 20	lb. oz. 18 0 15 4	ton. cwt. lb. 10 9 16 8 17 20

The two varieties of turnips were sown in rows 30 feet long, and 15 inches between the rows, and plants were thinned out to 2 inches in the rows. Extra Early White Milan gave the heaviest yield, and is an extra good variety with good clean bulbs, and flesh of fine texture.

PARSNIPS.

Variety.	Daté sown.	Date ready for use.	Yield per plot.
Intermediate	April 9	Sept. 14 " 14	72 lb. 51 "

Of the two varieties of parsnip grown Intermediate was the better, not only yielding well, but having clean roots of a good uniform shape and size. They were grown in rows 30 feet long and 30 inches apart, and plants were thinned to 2 inches apart in the rows. On the whole the yield was not up to the average.

PARSLEY.

Double Curled was the only variety of parsley tried. This is a fine variety with leaves of a dark green colour, but it would bear with a little selecting. This was sown on April 9, and was ready for use on June 23.

SALSIFY.

Only one variety of salsify was tried, viz., Long White. This was planted on April 9, and was ready for use September 1. Its merits can only be regarded as fair, most of the plants having a great number of fibrous roots. Twenty-six pounds were harvested altogether.

MARROWS.

ı	Variety.	Date sown.	Date ready for use.	Yield taken from 3 hills.
Mammoth Wh Custard White Long White Delicata	g iale Bush Scalloped	" 23 " 23 " 23 " 23	July 14 " 25 " 10 " 10 Aug. 21 July 21	lb. 537 447 172 1611 120 105

AGASSIZ.

The six varieties of marrows were sown on April 23, in hills 9 feet apart each way, and a first-rate crop was obtained. From weights taken from three hills Cream Trailing proved to be leader with a yield of 358 pounds. This is a cream coloured marrow of good uniform shape and size, and owing to its strong growth should be given plenty of room to develop. Though Mammoth Whale was second on the list this is not a variety that is recommended for table use, as it is too coarse, some of the fruit weighing as high as 40 pounds. Custard White Bush Scalloped are interesting as varieties from their peculiar shape, but are not recommended from a commercial point of view.

SQUASH.

Variety.	Date sown.	Date - ready for use.	Yield taken from 3 hills.
Hubbard Golden Hubbard Summer Crookneck Delicious	April 23 " 23 " 23 " 23	July 18 " 24 " 10 " 20	1b. 270 196 108 98

These were planted the same way as the marrows, 9 feet apart, and the weight was taken from three hills Hubbard gave the best satisfaction, and yielded 270 pounds of fruit, and Golden Hubbard did far better than last year, coming second with a yield of 196 pounds. Summer Crookneck is an interesting variety, and has fruit of an ochre colour covered with encrustations of a warty appearance. It is not, however, much good for practical purposes owing to its unusual shape.

PUMPKINS.

Variety.	Date sown.	Date ready for use.	Yield taken from 3 hills
Connecticut Field.	April 23 " 23	Aug. 21	lb. 261 121

The two varieties of pumpkin grown were very similar in general characteristics, except that the fruit of Connecticut Field was much larger, averaging 18 to 20 pounds each, as against 5 to 7 pounds each of Early Sugar. There was very little difference in the time taken to mature, both being ready about the last week in August.

CUCUMBERS.

Variety.	Date sown.	Date ready for use.	Yield taken from 3 hills.
Peerless or Improved White Spine. Extra Early Russian. Prize Pickling. Giant Pera. Cool and Crisp.	May 3 " 3 " 3 " 3	Aug. 27 27 Sept. 5 Aug. 23 July 30	lb. oz. 46 0 26 0 22 2 19 1 7 4

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Six varieties of cucumber were planted in hills 6 feet apart each way, and the yield was calculated from three hills.

The first variety to come into bearing was Cool and Crisp which was ready as early as July 30. Extra Early Russian, Giant Pera and Peerless or Improved White Spine were only three weeks later, but Prize Pickling was very late, not maturing before the first week in September. Both Extra Early Russian and Cool and Crisp are short stumpy cucumbers, but the latter is a poor yielder. Peerless or Improved White Spine provided the heaviest crop, and this is the best cucumber for market purposes, growing from 12 inches to 14 inches long, with fruit of good shape. Giant Pera is also a good shaped cucumber and a fair cropper.

MELONS.

Two varieties of melon of the cantaloupe type were tested this season. They were planted on April 6, and were ready for use on September 21. Salzer Earliest Ripe bore a quantity of fruit, but they did not grow to a very good size. Thirty-seven pounds of fruit were gathered from 3 plants. The other melon sown was a French variety, and although the actual weight of the yield was not as high, the fruit averaged more, one weighing over 6 pounds. This melon yielded 33 pounds of fruit.

CITRONS.

Sixty-five pounds of fruit were gathered off three hills of the one variety of citron planted. They were sown on the 11th April, and the first picking was made on the 6th August. They did exceptionally well, no doubt on account of the dry sunny weather experienced during the season.

SMALL FRUITS.

Of the small fruits, strawberries, blackberries and raspberries did reasonably well. Currants, both red and black, produced no fruit but made strong growth, and show promise of a good crop next season. Gooseberries made a poor showing, the growth being weak and the plants attacked with mildew.

STRAWBERRIES.

Of the three varieties of strawberries, Magoon, Sharpless and Paxton, the two first did well, but the third was a practical failure. This variety came into bearing late and the birds got most of the fruit. Following are given the respective periods of fruiting and amount of fruit.

. Variety.	Period of fruiting.	Amount of fruit.
MagoonSharplessPaxton.	July 3 to July 28 " 3 to " 28 " 9 to " 29	lb. 31 29 8

GOOSEBERRIES.

None of the varieties fruited this season, the growth in most cases being weak. The mildew was partly responsible for these poor results.

AGASSIZ.

CURRANTS.

These made strong growth. The abundance of fruit spurs and buds gives promise of a good crop in the coming season, both in the red and black varieties. Among the black currants, the strongest growers were Boskoop Giant and Victoria.

BLACKBERRIES.

Of the varieties planted Snyder gave, very good results for the first year, yielding some 164 pounds of fruit; fruiting lasted from July 16 to August 6. With the Erie variety no fruit was produced but strong growth was made and there are indications of a good crop next season.

Evergreen fruited well, the amount gathered being 12 pounds 13 ounces. This variety is particularly useful as it comes into bearing when the other varieties are

over for the season.

Logan-berries gave 8 pounds 1 ounce of fruit. The berries were ready on June 28. The results are very good, when it is considered that the canes have been planted only 10 months. Owing to the close planting and the rank growth of the canes, it was found necessary to thin out to a distance of six yards.

RASPBERRIES.

The best variety of raspberry was the Cuthbert, which produced a good crop of medium-sized berries. Fruiting lasted from July 2, when the berries were ready, until August 7, and 40 pounds of fruit were taken altogether. On account of its firmness this variety is particularly valuable for shipping.

Golden Queen gave 11½ pounds from July 3 to August 7, but the berry is not

suitable for shipping, being too soft.

Three varieties, Fillbasket, Superlative and Herbert, did not produce any fruit. Of these Fillbasket made extra strong canes, but the other two varieties were very poor.

ORCHARD.

An orchard containing apples, pears, plums, and cherries, planted in the spring of 1913, has, of course, not yet come into bearing. Most of the trees have made good growth, however, and are in good condition.

FLOWERS.

SWEET PEAS.

Two types of sweet pea were grown, the *Grandiflora* and the Waved type. Of the former eighteen varieties were tried, and of the latter thirty-nine, making a total of fifty-seven in all. In these trials the Maud Holmes (crimson) was the best of all and the King proved the best white pea. Other good varieties were Queen Alexandra, Lady Grisel Hamilton, Thos. Stevenson, and Florence Nightingale.

Below is given a list of the varieties used, with notes on colour, growth, etc.

	C.I.	
	Colour.	Remarks.
Grandiflora Types.	,	
Dorothy Eckford	White self	Strong grower and free flowerer. Colour more definite at the back
Mrs. Collier	Yellow	2 or 3 purple seeded ones. An older variety. Germinated badly, weak growth.
Prima Donna	Pale self soft pink	ly, weak growth.
Janet Scott. Czarina. Jeannie Gordon	Soft salmon pink	A good variety.
St. George	Bright orange scarlet	Slightly waved. This variety burns with the sun.
Miss Wilmott	Salmon red White, with blue stripe	Good variety, large flower.
Queen Alexandra	Crimson self.	Very good variety.
Rose du Barri	Mauve.	77
Helen PierceLord Nelson	Lavender self White, blue mottled Dark purple self.	Very good, popular variety. A good pea.
Black Knight	Dark maroon, shaded purple.	,
Waved Types. Nora Unwin	White	Good variety, large flowers.
Mrs. Hardcastle Sykes	White Buff with pink shading. A pale pink Countess Spencer. Bright rose pink standard with blushed wings on a pale cream	
,	blushed wings on a pale cream ground.	
America Spencer	Pale blue.	Large flowers. A flaked variety.
Flora Norton	Lavender flushed with pink	A good lavender variety.
Nubian Etta Dyke (primrose) Mrs. R. Hallam	Chocolate self. Primrose Deep pink on cream ground	A good variety but did poorly here.
Rosabella	Rose self	A fine rose variety.
Maud Holmes	Bright orange scarlet, wings lighter	Large flowers; best variety tried. Good variety, sun proof.
	with pink	Very fine pea.
Elsie Herbert	Pale pink shaded with salmon. Creamy white, edged with pink. Buff, edged with pink.	Very badly mixed.
Mrs. Cuthbertson	Rose pink with paler wings White self	Strong grower. Best white variety.
King Helen Chetwynd Stapylton Hercules	Rose pink, deeper colour at edges.	DOSC WILLOW VOLLETY.
LilianCzarina	Pale pink, flushed with buff. Salmon pink.	
Barbara. Edith Taylor. Cerise Spencer.	Salmon orange self	
Scarlet Emperor	Lilac blush.	Strong grower, sun-proof.
Moonstone Princess Marv	Pale lavender, lilac tinge	Very sweet scented. Strong grower.
Constance Oliver. Evelyn Beauty. Mrs. Hugh Dixon	Rich pink on cream ground.	
Etta Dyke	Creamy pink. White Primrose	Very good white variety.
Edrom Beauty.	Orange and rose.	Coour

GLADIOLI.

All the gladioli flowered well but owing to the dry season they did not last long in bloom. Most of the varieties, however, made nice flowering bulbs and corms for another year.

Notes on Varieties.

Variety.	Date of flowering.	Remarks.
Halley Lily Lilimum	July 7 " 27	Pink with fine spike. White with a tinge of yellow and pink at the throat.
Hollandis	Aug. 8	Large salmon yellow flowers, lined slight-
Commandant Martel	July 28 " 28	ly with red, striped inside, extra fine. A dark pink and free flowerer. A Lemoine variety white flushed with
J. H. Veitch. Pink Beauty.	" 29 " 1	pink, with a dark throat. A mottled rose purple. A salmon pink with a very dark red throat.
Joseph Hutol	Aug. 1 Sept. 4	A very dark purple blue and a good spike. A delicate apricot colour, very pretty, but not a very large flower spike.
America	July 6	A beautiful flesh pink of good substance.
Princeps		Large flower. This variety was not true to name. A poor searlet variety tinged with gold, instead of being a bright scarlet with very large flowers, extra fine.

ANNUAL FLOWERS.

The following annual seeds were sown outside in the herbaceous border in positions where they were to flower. Most of them did well, but owing to the very dry season in June, July and August, the flowering period was short.

Alyssum, sweet.
Balsam, mixed colours.
Bartonia aurea.
Candytuft, mixed.
Centranthus macrosiphon.
Chrysanthemum, annual, special mixed.
Clarkia elegans, special mixed.
Coreopsis in varieties.
Cosmea mixed.
Dimorphotheca hybrids.
Eschscholtzia, mixed.
Godetta in varieties.
Jacobea, double mixed.

Larkspurs in varieties.

Lavaterea rosea splendens.

Leptosiphon hybrids.

Linum grandiflorum rubrum.

Lupinus, annual mixed.

Mignonette, sweet scented.

Nasturtiums, in variety.

Portulaca, improved double mixed.

Scabiosa, large flowering mixed.

Brachycome iberdifolia, mixed. (Swan river daisy.)

Sweet sultan, mixed.

Viscaria cardinalis.

Several other flower seeds were sown in rows outside and others in boxes in the hotbeds. These were pricked off.

Dahlias.—There is only a very limited collection of these here, some nine varieties of the old fashioned decorative type and two varieties of cactus. These flowered very well from the end of June right up to the end of October.

FLOWERING SHRUBS.

On account of the mild, dry autumn and winter of 1913, the trees and shrubs ripened early and flowered profusely in spring and summer. Since the majority flowered before July, they were not seriously affected by the dry spell. Among the

shrubs the kinds to be specially noted were: Azaleas, rhododendrons, kalmia, forsythia, ceanothus, deutzia, berberis, ligustrum, magnolias, pyrus japonica, kerria, lilac, hydrangeas, etc. Of the deciduous trees those giving the best display were: cornus, ornamental flowered cherries, limes, laburnums, acacia, tulip tree, maples, ornamental crabs, chestnuts (scarlet and horse), and mountain ash.

Following are some individual notes on the various trees and shrubs in the garden:—

Azaleas.—The varieties planted here are mollis, pontica and Ghent. These flower freely and make a great show in the spring months. Some of the Ghent varieties which were imported two years ago are doing excellently, being well set with buds.

Berberis.—Two varieties are grown, vulgaris and Aquifolium. Vulgaris is a hardy plant with small yellow flowers, but owing to the moist climate of this district, it is apt to get mossy. Aquifolium is an evergreen variety with large spikes or plumes of yellow flowers to which the bees are very partial. This shrub produces a purple berry.

Colutea arborescens (Bladder senna).—Flowers slightly resembling laburnum, followed by curious inflated seed-pods, which hang for a long time. Very suitable for planting on dry banks and poor soil.

Ceanothus.—Several varieties were planted in the spring of 1913 and this autumn they all flowered freely and retained their bloom longer than any other shrub.

Cornus alba sibirica elegantissima.—A silver variegated form, most effective.

Cornus alba sibirica mascula (dogwood) foliis variegata.—This is often grown as a standard, and planted among other dark shrubs shows up well.

Corchorus (kerria) Japonica flore pleno.—A very pretty double yellow free flowering shrub, which comes out in May and June.

Pyrus (Cydonia) japonica (Japanese quince).—One of the earliest. Bright scarlet flowers which appear before the foliage.

Daphne Mezereum alba.——Comes into flower early in February. Quite leafless, but covered with a wreath of small fragrant white flowers.

Diervilla (weigelia) florida.—Pink blossoms. A strong grower and flowers freely.

Diervilla (weigelia) Eva Rathke.—A very beautiful, deep-coloured variety. Flowers dark red.

Diervilla (weigelia) Looymansii aurea.—Variegated golden foliage and very abundant rose-coloured flowers.

Deutzia crenata flore pleno.—Double rose-coloured flowers. Blooms in June and July.

Deutzia candidissima plena.—A double white form of the above.

Forsythia suspensa.—Flowers in the spring. Yellow, bell-shaped blossoms. A good pendulous shrub.

Forsythia intermedia.—Bright yellow flowers, which appear in April. More of the bush form than the suspensa.

Halesia tetraptera.—Snowdrop or silver bell tree. Flowers snow white, produced in great profusion, resembling snowdrops.

Hibiscus (Althwa frutex).—Several of these were planted in the spring, but have not flowered yet.

AGASSIZ.

Hydrangea paniculata grandiflora.—This is one of the most beautiful of all our flowering shrubs, producing great drooping panicles of white flowers, which turn a faint pink as they grow older. Requires close pruning, since it is from the young growths that the flowers are produced.

Hydrangea hortensis rosea.—Beautiful shrub with immense heads of pink flowers. In the winter the hortensis varieties require slight protection. There are several other varieties of the hortensis which were planted last spring. They did not bloom, but have made good growths.

Hydrangea arborescens grandiflora.—A new white variety, a distinct habit. This flowered the first year.

Magnolia.—There are several fine specimens of these to be found here. Amongst the notable ones are: Conspicua (a very fine shrub), Lennei obovata, Soulangeana, and tripetala (umbrella magnolia)

Philadelphus (mock orange).—This is to be found wild here. 'There are some large plants of the named varieties on the farm, but they are in very poor condition. Some young, named varieties were planted twelve months ago, and are doing well, but they have not yet flowered.

Spira japonica, Anthony Waterer.—A splendid dwarf growing variety, covered with deep crimson flowers which keep their bloom a long time.

Spiraa aurea.-A golden-leaved variety with a small white flower.

Spira Thunbergii.—A dwarf variety with small white flowers almost covering the branches.

Spiraa Van Houttei.-A very similar variety, but taller than Thunbergii.

Kalmia latifolia (mountain laurel).—The first of all the American peat-loving plants. Every garden should possess this beautiful flowering evergreen, bearing dense clusters of beautiful pink, wax-like flowers in the months of June and July. It is very hardy.

Rhododendron, hybrids and named varieties.—Two years ago several of these were imported and this last summer they have made good growths, considering they had to be watered several times during the very dry spell. Most of them are well set with buds for the coming season. Several varieties flowered last season. The old plants that have been here for some years all flowered well, also the pontica varieties in the months of May and June.

Syringa (lilac).—Charles X., single deep purple and fine truss; Madame Lemoine, double compact spike of pure white; President Grevy, double blue shaded rose, large; Socur de Louis, single large bright purple, not only in bud but when quite open.

All the above lilacs do well here, and flower very freely in the month of May, but they would be improved if planted in richer soil.

Viburnum Opulus (Guelder rose).-Produced coral red berries in the autumn.

Viburnum Opulus sterile (Snowball tree).—A beautiful flowering shrub with large globular double white flowers; this makes a fine show in May.

ROSES.

During the whole summer the roses flowered very well, and considering that they were planted only this spring, most of the varieties made good growth. The following varieties did the best:—

Caroline Testout, Gruss an Teplitz. Dean Hole. Betty, Capt. Christy. Mad. Cochet. Dorothy Page Roberts. Mrs. Aaron Ward. Mrs. J. Laing. Ulrich Brunner. Killarney. La France. Mad. Abel Chatenay. Hugh Dickson. Mad. Ravary. La Progres. A. K. Williams. Frau Karl Druschki.

TREES AND SHRUBS (EVERGREEN AND DECIDUOUS).

Pinus Cembra (Swiss stone pine).—A very distinct species of conical growth.

Pinus Strobus (Weymouth pine).—Very hardy and likes a deep moist porous soil; there are some fine specimens of this pine here.

Pinus inops.—This is a very spreading tree about 12 feet through and the same in height. Its chief characteristics are a very branching form and short needles. It produces a great quantity of cones.

Pinus resinosa.—This pine does well out here and this last season has made growths of from 12 to 18 inches. Its habit of growth is compact and more upright than that of the Austrian pine. The needles are also longer than the Austrian and more of a glaucous nature.

Pinus Jeffreyi.—Very distinct, and should have a position in every pinetum.

Pinus sylvestris (Scotch fir).—This pine does well here and makes a stately tree. Some are 40 to 50 feet high.

Abies amabilis (syn. Picea amabilis).—Considered the most ornamental of all the silver firs. It has dark, glossy green leaves, glaucous underneath, and thickly set on the branches.

Abies Nordmanniana (syn. Picea Nordmanniana).—A very handsome tree with large spreading branches. This should be extensively planted, especially as a specimen tree.

Abies concolor (syn. Picea concolor).—A very fine evergreen of a glaucous nature.

Abies concolor var. violacea.—A beautiful fir, with glaucous leaves. One of the finest of the silver firs. Being thoroughly hardy it is a decided acquisition.

Picca Mariana (syn. Picca nigra) (black spruce).—A highly ornamental tree, close, compact and a slow grower. Suitable for damp situation and can be closely planted for a windbreak.

Picea canadensis (hemlock spruce).—Has a graceful drooping habit, small leaf, glaucous on under side. Requires a moist situation. Well worth a prominent position in the pleasure grounds.

Picea pungens glauca (Blue spruce).—A lovely spruce with glaucous leaves.

Ilex Aquifolium (Common holly).—This does well here, and berries were to be found on some of the plants this winter.

Ilex Aguifolium Hodginsii.—One of the best broad-leaved varieties.

Ilex Aquifolium argentea marginata.—A broad-leaved silver variety. Free grower and hardy.

Ilex Aquifolium ferox (Hedgehog holly).—A very indented variety with curly leaves.

Ilex Aquifolium argentea lucida (Silver Queen).—A silver variety of the above form. It is very slow growing here, and it is planted on gravelly soil.

Pinus austriaca (Austrian pine).—Like P. sylvestris this is another pine that is doing well here on gravelly soil. It makes a good shelter tree.

Sequoia gigantea (Wellingtonia), Mammoth tree.—This does not do well here, on account of the cold North winds but where it is sheltered it grows better. In favourable positions the Wellingtonia attains a great height.

Taxus (Yew).—There are six varieties of yews on this farm, viz., baccata, adpressa, erecta, fastigiata, Barroni, and aurea. All of these seem to be thriving well.

Thuya occidentalis (American arbor vitæ).—A fast growing shrub which is much used for hedging.

Thuya occidentalis globosa compacta.—Very similar to occidentalis but instead of growing erect, it is of a globular shape.

Thuya occidentalis erecta viridis.—A compact upright growing variety. The specimens here are 25 to 30 feet high.

Thuya occidentalis lutea (Golden arbor vitae).—Nice golden colour and fairly hardy.

Thuya occidentalis Little Gem.—One of the dwarf green varieties.

Cupressus Lawsoniana (Lawson Cypress).—A very strong growing green variety which stands the cold very well and also the winds.

Cupressus Lawsoniana lutea.—A beautiful form of the Lawson cypress; is constant in colour and perfectly hardy, one of the most effective garden plants.

Cedrus atlantica glauca. This is a lovely evergreen tree with glaucous foliage, but needs protection from winds.

Araucaria imbricata (Chati pine or Monkey Puzzle).—This is a most distinct tree. It should be planted in a sheltered position.

Taxodium distichum (Deciduous cypress).—Very ornamental with light feathery foliage, changing to rich brown in the Autumn.

Acer (Maple).—There are several varieties of these on this farm, the most prominent varieties being pseudo-platanus and pseudo-purpurea. These two varieties are planted at either side of the drive and are very much admired.

Other varieties of note are: campestre (English variety), colchicum rubrum, platanoides (Norway Maple), platanoides Drummondii, a handsome silver margined variety, Pseudo Leopoldii, Pennsylvanicum (striatum), (Snaked barked), Negundo foliis variegata, a fine silver variegated variety, but rather too much moss on it in this district. Negundo foliis argentea, a golden variety of the above. It is perfectly clean from moss.

Several varieties of the Japanese or Palmatum varieties have attained a large size, the most prominent varieties being: atropurpurea, palmatum, aurea maculata, roseu marginata, Osakuzukii, septemlobum purpureum septemlobum tricolor.

The Japanese or Palmatum varieties are very subject to attack from fungi and mosses, unless sprayed every year.

Robinia.—Of this large family, there are two varieties to be found here

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Robinia Pseud-acacia (locust tree) which is very fine when in bloom, but is a very free seeder and if not kept in check is liable to cause trouble.

Robinia Pseudo-inermis, the Mop-headed variety forms a compact head. This tree should be planted in a sheltered position, as the wood is so brittle the branches are apt to break.

Ash (Fraxinus).—There are no specimens of the common variety here, but there are several species named below. They are all doing well with the exception of excelsior concavaefolius foliis variegatis. The other varieties to be found are: excelsior laciniata, excelsior aurea, golden barked variety, excelsior aurea pendula.

Beech (Fagus).—Fagus sylvatica laciniata (Fern or cut-leaved).—Several fine specimens of this variety are to be found here.

Fagus sylvatica purpurea pendula. For a specimen tree on a lawn this is a tree that can well be recommended, but to show its true character it should be planted away from other trees.

Fagus sylvatica purpurea.—This is one of the first of all our ornamental trees, and will stand the severe winter and winds.

Fagus sylvatica purpurea tricolor.—A purple leaved variety bordered with delicate rose.

Birch (Betula) .-- A most graceful tree at any season of the year.

Betula alba pendula.—A drooping form. This makes a fine specimen tree for a lawn.

Betula alba purpurea.—Rich dark purple leaves, graceful habit and highly ornamental with its silver stem.

Chestnut, Horse (Aesculus Hippocastanum).—A very handsome flowering tree, splendid for exposed situations. Requires fairly good land.

Chestnut, Spanish (Acsculus vulgaris).—There are several varieties of these in the poultry yards, but some of them were diseased and were taken out this fall. The timber of this tree is most valuable for its durability.

Chestnut, Scarlet Horse (Aesculus carnea).—A scarlet variety. This makes a fine specimen tree for parks, avenues, boulevards or hedge-rows.

Cherry (Cerasus).

Prunus (Cerasus) Sieboldii alba fl. pl.—This is a beautiful tree when out in flower in the month of May.

Prunus (Cerasus) vulgaris alba, fl. pl.—Another form of the above, but this variety flowers earlier.

Prunus (Cerasus) Wateriana.—This is a double pink variety, and when out in bloom is a fine sight. The finest of the pink varieties is J. H. Veitch, which has larger flowers than the above.

Colutea arborescens (Bladder senna).

Cornus storida.—A handsome free growing dogwood bearing large creamy white flowers, two inches across. The foliage in the autumn turns a beautiful deep shade of crimson and remains on the tree for a long time, making a fine contrast.

Cornus florida pendula.—A weeping variety of the above.

Cornus florida rosea.—The same as florida, but a pink variety, and the foliage in the autumn is, if anything, a finer crimson.

AGASSIZ.

Corylus (Hazel).

Corylus Avellana.—On this farm there are several of the European fruiting varieties, and they all bear well.

Corylus Avellana atropurpurea (Purple-leaved filbert).—Makes a very attractive bush all the summer. Any one making a shrubbery should include this, as it is most showy.

Elm, English (*Ulmus campestris*).—This is a tall and elegant tree of rapid and erect growth on good well drained soil. At either side of the entrance to the farm, there will be noticed a stately row of them.

Hickory (Carya).—This is a fine stately tree and in spite of the damp climate it keeps free from moss. It also fruits very freely. A valuable tree for its timber.

Halesia tetraptera (Snowdrop or silver bell tree).—Flowers, snow-white, produced in great profusion, resembling snowdrops.

Laburnum (Cytisus vulgaris).—There are two varieties grown here, the common variety and the vossia. The latter has flower spikes from fifteen to eighteen inches long. This is the finest of all the laburnums.

Larch (Larix Europaea).—This is a most valuable timber tree, but it does not grow to such a size nor as rapidly as in its native climate.

Pseudo-Larix Kaempferi.—The golden Chinese larch, very similar in the stem to the Japanese variety.

Medlar.—A slow growing tree with white flowers, which come out in June and bear fruit which is ready in October.

Mulberry sp.—Owing to the poor soil the tree is in, it produced very little fruit which was ready in the month of August.

Mulberry, Morus alba pendula.—A weeping variety which also did not bear much fruit.

Quercus (Oak).—Several varieties are to be found here and all seem to do well.

Amongst them are to be noticed:—

Cerris (Turkey Oak).

Cerris foliis argentea (silver variegation).

Coccinea, the scarlet oak, a very fine variety, the leaves of which turn bright scarlet in the autumn. This is one of the American varieties.

Lime (Tilia).—These do well here and are very useful as a bee food, when in flower in the months of July and August. The varieties on the Farm are: Europaea, Americana, Alba, and Red twigged.

Gymocladus canadensis (Kentucky coffee tree).—This does not seem to grow very fast here, but is of interest, with its large handsome foliage.

Alder (Alnus).—Alnus glutinosa imperialis (Cut leaved variety).

. Salix (Willow).—Vitellina (Yellow osier).—This forms a very ornamental tree and a fast grower. In the winter time, both this and the scarlet-barked variety have a very bright and pleasant effect.

Pyrus malus atrosanguinea.—This flowered very freely in the latter part of April and in early May, but the trees are not in extra good health.

Poplar, Lombardy (Populus nigra var. pyramidalis).—A very ornamental, upright growing tree. A most useful tree for close planting to act as a block.

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Plane, Platanus acerfolia (London plane).—This is a splendid variety for avenue and street planting. It also makes a fine shade tree.

Tulip tree (*Lirondendron tulipifera*).—A very ornamental tree with large saddle-shaped leaves and tulip-like flowers. This flowered very freely in the month of June.

Black Walnut (Juglans nigra).—This variety fruited very well. The Japanese varieties did not fruit very freely this year, but they make splendid shade trees.

HEDGES.

The hedges are of interest here and take up quite a portion of the garden. Several of the poorer ones were taken out this last spring and what are left still make a good collection. During the summer months they were dug along either side, which has improved them a great deal. The following are the varieties still here.

Ligustrum sp.—Height 6 feet. This is a very good plant for a hedge, the best variety being Ligustrum ovalifotium. This has a larger leaf than the common or evergreen variety but the latter being a cheaper variety, can be well recommended.

: Salix, red-twigged var.—This has made a very compact hedge, but is not so ornamental as some of the other hedges. Height 5 feet.

Beech, common European.—This is a fine hedge, being both ornamental and useful. The beech retains its leaves until spring, so gives some colour during the winter months. Theight 4 feet.

Thorn, common European.—This is a very useful hedge, is a quick grower and can be trimmed easily; but in this damp climate, it is inclined to be mossy. Height 6 feet.

Deutzia gracilis.—The late frost in April killed the bloom in its young state, so very little flower was to be seen this year, but during the summer the hedge made a good lot of young growth. Where the soil is poor and sandy, it has not made such strong growth. In some places it is subject to moss. Height 4 feet.

Hemlock spruce.—This is a fine wide hedge and is to be well recommended for ornamental work. Height 4 feet.

Picea pungens (Rocky Mountain spruce).—This makes a nice evergreen hedge about 3 feet 6 inches.

Taxus baccata erecta.—This is a slow-growing variety, but this season it has made better growth. Height $2\frac{1}{2}$ feet.

Holly, common.—This is the finest hedge of any and very much admired. As 'well as being a useful hedge, it is very ornamental and at all times it is very tidy. Height 5 feet 9 inches.

Retinospora squarrosa.—A neat compact hedge, but only suitable for ornamental purposes. Height 3 feet 6 inches.

Acer campestre.—This is a strong grower and requires cutting back. It is very pretty in the summer time when it shows its red tips. Height 6 feet.

Box (Common variety).—This has made very slow growth. Height 1 foot.

Salix (Rosemary-leaved).—Although a pretty plant, it does not make a good hedge. Height 2 feet.

Buckthorn.—If kept in control, this should make a useful hedge, but it is inclined to be dirty as the weeds are hard to get out at the base. Height 3 feet.

Yew $(Taxus\ baccata)$.—This is a very ornamental hedge and compact in habit and is evergreen. Height $2\frac{1}{2}$ feet.

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Spiraea crenata.—In its young state, this hedge would look very well, but as it gets older it is very untidy in appearance at the base. Height 4 feet.

Spruce, Norway.—This is a very compact hedge but the sides have got very bare. Height 4 feet.

CLIMBERS.

There are not many varieties but the following are doing well here:-

autumn.

Aristolochia Sipho (Dutchman's Pipe).—This is a very stately climber with its large leaves and is a very rapid grower. It flowers freely but the flowers are very small. Several seed vessels were found on the plants this autumn.

Ampelopsis hederacea (Virginia creeper).—This is a very strong grower, but not one of the self-clinging varieties. In the autumn the foliage turns a beautiful scarlet before falling. This also seeded freely.

HERBACEOUS PLANTS.

The plants in the herbaceous border this year are as follows:—

Agrostemma (Rose Campion). Anchusa italica (Dropmore variety). Anemone japonica alba (Japanese windflower). Anemone japonica (Co p d'Argent).
Anemone japonica (Whirlwind).
Aquilegia (Columbine).

Arabis alpina fl. pl.

Boltonia asteroides. Campanula carpatica. Campanula persicifolia alba. Campanula latifolia alba.

Campanula persicifolia alba. Campanula medium (Canterbury bells). Chrysanthemum maximum ...

Clematis recta.

Convallaria (Lily of the Valley). Phlox, named varieties.

Henry Murger. Bridesmaid

Vesuvius. Mad. Paul Dutrie. Geo. A. Strohlein.

Bacchante. Helen Vacaresco. Siebold (scarlet).

Antonin Mercie. Alpine varieties.

Phlox ovata, an evergreen foliage variety with deep rose flowers.

Phlox S. F. Wilson, a dwarf mauve variety.

Paconics.—There are several unnamed French varieties that flowered very freely in the month of June.

Papaver orientale.

orientale var Salmon Queen. nudicaule (Iceland porpy). Polemonium, Richardsonii album. Rudbeckia laciniata fl. pl. (Golden

Glow). Rudbeckia Newmannii. " nitida autumnalis.

Scabiosa caucasica. Spiraa Aruncus.

Spiraa chinensis rosea. japonica.

6.6 Venusta. Thalictrum adiantifolium.

glaucum. flavum.

dipterocarpum. Trollius (Globe flower). globe).

Yucca filamentosa.

Wistaria chinensis.—This flowers very freely in May and June and again in the

Coreopsis grandiflora.

Cimicifuga racemosa.

Delphiniums, species,

Digitalis (Foxglove).

Galega officinalis alba. Cypsophila paniculata.

Helianthus maximus.

Iberis sempervirens.

iris).

Coquelicot.

Mrs. Jenkins.

Von Hochberg.

R. B. Struthers.

Von Lassburg.

Jeanne d'Arc.

Selma.

Edmund Rostand.

Helenium autumnale (Riverton Gem):

Helianthus multiflorus (Soleil d'Or).

I is germanica (F.ag, iris). Iriis Kaempferi (lævijata), (Japanese

Helianthus rigidus (Ha palium).

Hemerocallis flava (Day Lily). Hemerocallis (Soleil d'Or)

Iris sibirica (Siberian iris).

Lupinus polyphyllus and albus.

AGASSIZ.

EXPERIMENTAL STATION, INVERMERE, B.C.

REPORT OF THE SUPERINTENDENT, G. E. PARHAM.

The Invermere Experimental Station is situated in the midst of country of which the land on the farm is distinctly typical. The soil is light, deficient in humus and has a moraine subsoil. This is essentially an irrigation country.

THE SEASON.

The season of 1914 was, on the whole, unfavourable for horticultural work. The spring was backward, and July was the only month in the year without frost. Work on the land began the first week in April, but seeding did not commence till April 23, and cold nights and high winds retarded the growth of all herbaceous plants, and rendered them late in blooming. Our location in the Columbia Valley, with the Rocky Mountains on the east, and the Selkirk range on the west, considerably shortens our hours of sunlight; and reports from surrounding districts seem to indicate that we are from ten days to a fortnight behind other places in the same latitude which are not so confined by the mountain ranges. Rain fell at fairly short intervals and it was necessary to irrigate most of the vegetable plots only once.

VEGETABLES.

Asparagus.—The asparagus planted in the autumn of 1913 stood the winter well, and made good growth. From the fact that it was planted in rows three feet apart, it was possible to cultivate it entirely with a single horse cultivator. An application of farm manure was made in the autumn.

Beans.—Nine varieties were tested. They were sown May 13, and irrigated once on June 8:—

Name.	Ready for use.	Total Yield.
1. Extra Early Refugee. 2. Extra Early Valentin.e. 3. Wardwell Kidney Wax 4. Valentine Wax. 5. Golden Wax. 6. Refugee, or 1,000 to 1. 7. Grennell Rustless Wax 8. Bountful Green Bush. 9. New White Seeded Stringless Green Pod.	" 30. " 23. " 30.	0 " 3 " 10 " 1 " 12 " 12 " 1 " 4 " 11 " 10 "

Brussels Sprouts.—Dwarf Improved made good growth, and produced sprouts of excellent quality.

('abbages.—Fifteen varieties were tested. The seed was sown in the open on April 23. All germinated well, but the young plants were badly attacked by the Lesser White Cabbage Moth and appeared to be almost destroyed. The plants were dressed with pyre-

thrum powder mixed with some of our powdery soil in place of flour as generally used. They recovered marvellously as soon as better weather conditions prevailed and produced good yields. Irrigated once on June 8.

Name.	Sown.	Ready for for use.	Average weight.	Quality.
			Lb.	
1. German Nofalt. 2. Erfurt Small. 3. Lubeck. 4. Magdeburg. 5. Winningstadt. 6. Early Jersey Wakefield. 7. Large Flat Drumhead, Late. 8. Ex. Early Midsummer Savoy. 9. Fottler Improved Brunswick. 10. Paris Market, Very Early. 11. Copenhagen Market. 12. Danish Summer Ballhead. 13. Flat Swedish. 14. Ex. Amager Danish Roundhead. 15. Impd. Amager Danish Roundhead.	" 23	July 27. Aug. 12. 20. 11. 20. 21. 20. 21. 20. 20. 20. 20. 20. 20. July 22. Aug. 12. 20. 32. 40. 32. 40. 40. 40. 40. 40. 40. 40. 40. 40. 40	9 5 4	Good. Good. Good. Fair. V. Good. Fair. V. Good. Fair. Good. T. Good. Good. Good. Fair. Good.

Cauliflower.—The three varieties, viz.: Early Snowball, Extra Selected Early Erfurt Dwarf and Danish Giant produced some good heads and were about equal in merit.

Carrots.—Of the two varieties tested, Half Long Chantenay and Improved Nantes, the former gave the better results, although both did well.

Celery.—Seven varieties were tested. They were sown in hotbed on May 17, but owing to the unfavourable condition of the hotbed, the germination and early growth was slow. They were placed in the cold frame on June 4, and planted out in trenches on July 7. Though the results on the whole were not good, the following varieties made the most satisfactory growth, and were ready for use by November 1: Giant Pascal, Evans Triumph and French Success.

Cucumbers.—Planted in the open were a complete failure, being killed by early frost.

Corn.—Fourteen varieties were planted on May 29, on well manured land. Early Malcolm was the only variety of which cobs developed sufficiently for table use, though all made luxuriant growth.

Name.	Sown.	Height.	Weight of Fodder.	Cobs.
1. Pocohontas. 2. Early Iowa 3. Metropolitan. 4. Early Evergreen. 5. Country Gentleman. 6. Early Fordhook. 7. Golden Bantam. 8. Stowell Evergreen. 9. Extra Early Adams. 10. Black Mexican. 11. Perkins Extra Early Market.	" 29 29 29 29 29 29 29 29 29 29 29 29 29 29 29 29 29 29	Ft. in. 5 0 4 0 5 0 4 6 5 0 2 10 3 0 2 6 3 0 2 0	Lb. 186 119 179 174 141 130 116 113 73 97 128 78	Few. " None. " Few. None. Few fit for table.
13. Early Malcolm	" 29	2 6	246	Many, some
14. Malakoff	" 29	5 0	196	Few.

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Lettuce.—Eleven varieties were tested in the open. Owing to the unfavourable conditions in the early spring none produced good heads.

Musk Melon and Water Melon.—These were all frosted and a failure. Water melon and Musk melon which remained in the hotbed did well and produced fruit. One Musk melon weighing 44 pounds, was cut September 30, and a Water melon weighing 20 pounds was harvested on September 14.

Onions.—Seven varieties were tested. The seed was sown in the open on April 27. but the cold weather checked the growth and no good results were obtained, except from young onions transplanted in June.

Parsley.—Double Curled made vigorous growth. Boxes placed in the cellar kept a good supply of green parsley for use throughout the winter.

Parsnip.—Good roots were produced by both varieties, viz.: Improved Hollow Crown and Intermediate.

Pepper.—Four varieties were tested. The growing season, however, was too short for any to come to maturity.

Peas.—Fifteen varieties were sown on April 23, in rows 30 feet long. The Lincoln and Telephone were considered the best quality.

Name.	Sown. Pickt.		Ing.	Height.	Total Crop.
1. Dainty Duchess 2. Gradus 3. Sutton Excelsior 4. McLean Advancer 5. Gregory Surprise 6. American Wonder 7. Premium Gem 8. Heroine 9. The Lincoln 10. Juno 11. Stratagem 12. Telephone 13. Thos. Laxton 14. Quite Content 15. Early Giant	" 23	" 16 " 23 " 23 " 14	Aug. 10 " 10 " 10 " 10 " 10 " 10 " 10 " 14. Aug. 10 " 10 " 10 " 10 " 10 " 10 " 10 " 10 " 10 " 10 " 10 " 10 " 10	ft. in. 3 6 2 6 2 0 3 0 1 6 1 0 3 6 2 6 3 0 4 0 4 0	1b. oz. 22 0 17 0 15 4 21 0 15 8 11 0 7 0 23 0 20 0 14 0 20 0 13 0 19 0 13 8

Five varieties of peas for canning were also tested which gave the following returns per row of 50 feet:—

	Lb.
Richard SeddenTotal Crop.	30
Saxonia	35
Pride of Market	291
Yorkshire Hero	37½
Excelsion	34

Samples of each were canned and the following were considered the best flavoured viz.: Excelsior and Pride of the Market.

A late planting test of the following varieties was also made:-

Name.	Date of Sowing.	Ready for Use.
1. Stratagem. 2. Thos. Laxton. 3. Excelsior. 4. Gradus. 5. Heroine. 6. Gregory Surprise. 7. American Wonder.	" 30	Did not mature. Aug. 25 " 20 Sept. 7 " 26 Aug. 15 Sept. 1

Tomatoes.—Nine varieties were tested. Seed sown in hotbed April 8, and plants pricked out May 15. Cold winds in June stunted their growth and few plants produced mature fruit. The plants were cut by frost in August.

Potatoes.—Were planted in rows of 66 feet, sets 1 foot apart, and rows 30 inches apart and gave the following results:—

Name.	Character.	Flavour Texture	Ckg.	Mark. Yd.	Un- mark.	Matured.
1. Empire State 2. Eureka Extra Early 3. The Factor. 4. Gold Coin 5. Early Ohio 6. Early White Albino 7. Early Rose 8. Early Rose 9. Early May 10. Early Metro 11. Early Hebron 12. Dobbie Prolific 13. Delaware 14. Up-to-date 15. Pan-American 16. Wee McGregor 17. Sir Walter Raleigh 18. Snow 19. The Scott 20. Table Talk 21. Todd Wonder 22. American Wonder 23. Bovee 24. Burpee Extra Early 25. Carman No. 1. 26. Conquering Hero 27. Clyde 28. Dalmeny Hero 29. Silver King 30. Manistee 31. Late Puritan 32. Irish Cobbler 33. Houlton Rose 34. Green Mountain, 1838 35. Green Mountain, 1837. 36. Bermuda Early 37. Scottish Triumph	Irr. Deep Reg. Shlw. " " Deep " " Med. " " Deep " " Med. " " Reg. Deep " " " " " " " " Shlw. " Irr. Deep " " " " " Shlw. " Irr. Deep " Reg. Shlw. " " Shlw. " " " " " " " " " " " " " " " " " " "	V.G. V.F. P. Fl. M. " G. V.F. P. Waxy M. V.F. P. Fl. P. " V.G. V.F. V.G. Fl. P. " V.G. V.F. G. " V.G. V.F. P. Waxy P. Fl. G. " V.G. V.F. P. Waxy P. Fl. G. Fl. P. Waxy P. Fl. R. Waxy P. Fl.	S	Lb. 46 49 28 43 68 55 75 48 68 37 57 89 1 87 40 49 65 56 49 47 40 49 65 49 47 51 82 49 66 67 24 31	Lb. 17 22 18 11 13 16 18 16 19 20 12 14 18 19 20 12 14 18 19 19 27 7 28 18 27 14 18 27 19 29 19 27 7 28 18 27 14 18 27 28 13 30	Aug. 25 " 25 Sept. 1 " 10 " 25 " 10 " 10 " 25 " 10 " 10 " 25 Sept. 1 " 1 Aug. 25 " 1 " 1 Aug. 25 " 15 " 15 " 25 Sept. 1 " 1 Aug. 25 " 15 " 25 Sept. 1 " 1 Aug. 25 " 25 Sept. 1 " 1 Aug. 25 " 25 Sept. 1 " 25 " 25 " 25 Sept. 1 " 25 Sept. 1

The above tabulation necessitated a number of abbreviations. Character describes shape of potato, whether deep or shallow eyes. Flavour: Good, medium or poor. Texture: Waxy or floury. Cooking: Fast, medium or slow.

SQUASH.

Name.	Sown.	Ready for use.	Average weight Hill.
1. Long Vegetable Marrow 2. Long White Bush 3. Mammoth White 4. Hubbard 5. White Congo. 6. Custard Marrow White Bush Scallop 7. Golden Hubbard 8. Crookneck 9. Delicious 10. Delicata	" 8 " 8	July 25	Lb. 68 31 36 28 00 13 18 16 3 17

Egg Plant.—These were frosted before they had time to mature.

Rhubarb.—Three new varieties, Prima Donna, Raspberry and Monarque were added to the five varieties planted in 1913, which latter have made luxuriant growth and promise well.

Sea Kale.—A test was made of the value of sea kale as a winter vegetable. Year-old crowns, placed in the cellar for the winter, were moved nearer the furnace on February 16, the crowns being covered with boxes and sacking. By March 4 the average height was 12 inches, and three crowns cut weighed 14 ounces. On March 12 the last heads were cut (thirteen in all), the total weight being 4 pounds 2 ounces. The table qualities were excellent. We also have for further experimentation a number of "whips" which were placed in boxes of earth for the winter. These showed signs of growth on February 24, and will be planted out as soon as weather conditions are favourable.

Citron and Pumpkin.—Both grown in the open, did well and produced good yields.

Cultural Operations and Irrigation.—As in the previous year, all garden truck was so arranged that it could be cultivated with the Planet Junior horse cultivator. Although, as yet, the destruction of annual weeds has not been a serious problem, constant cultivation is necessary in order to keep a good dust mulch as a means of retaining soil moisture.

Rain fell at opportune times, thus necessitating only one irrigation for most of the vegetable plots.

FLOWERS.

Bulbs.—Tulips, Daffodils and Scillas planted in the autumn of 1913 made a splendid showing during the months of April and May, and were much admired. The tulips were especially fine, and, out of the twenty-four varieties planted, the following were considered the best: Pottebakker, White and Scarlet, Keizerskroon, Proserpine and the Darwins.

Crocuses produced blossoms which never showed above the foliage.

Sweet Peas.—Sixty-three varieties were seeded in the hotbed and planted out on May 4. They were in bloom on July 1. They blossomed well and continued to make a good show until the third week in October. Noticeably excellent varieties were: Elsie Herbert, Helen Pierce, St. George, Doris Usher, Prima Donna, Nubian, Asta Ohn, Barbara.

INVERMERE.

BUSH FRUITS.

All bush fruits, planted in the spring of 1913, have made good growth and promise to yield good crops next season. The fruit from two bushes of Oregon Champion gooseberries produced 4 pounds 3 ounces and 3 pounds 11 ounces respectively.

APPLES.

The experiment with apples is as yet not sufficiently advanced to allow any conclusions as to the suitability of the locality for apple culture, or as to which varieties will do best. The trees which made a good start in 1913 have continued to make satisfactory growth.

The Cultural Tests set out in 1913, of which particulars are given in the annual report of that year, have been continued.

ORNAMENTAL SHRUBS AND TREES.

A consignment of ornamental trees was received from Ottawa on May 14 and planted in a nursery, to be transplanted when the ornamental grounds of the Station are laid out. An avenue of Norway maples has been planted along the southern boundary of the experimental grounds on a road leading to the hospital, and also along the north drive. The trees in both cases are planted 30 feet apart and have made a good start. They are protected by simple but efficient guards made with three posts and wire.

EXPERIMENTAL STATION, SIDNEY, B.C.

SAMUEL SPENCER, FOREMAN-MANAGER.

The spring work commenced early in April at the Sidney Station with fine weather and light showers. During this season many fruit trees, including all the important kinds at all likely to succeed, were planted out, as well as ornamental trees, shrubs and herbaceous plants. By May, sweet peas were 3 feet high and in full bloom. During June the cold nights with dry weather checked growth generally; both in this month and July vegetables suffered from lack of moisture. The records of the season's growth of the fruit trees show a strong growth. Some of the orange trees which are being tested made a growth of 10 inches. The remarkable climate of this district is shown by the fact that the extreme variation between maximum and minimum temperature in summer is 44 degrees and in winter only 25 degrees. The lowest temperature in the winter of 1914-15 was 27.5° Fahr. in January, 1915. Fall ploughing and systematic drainage are important to prevent souring of the soil during the winter when three-fifths of the yearly rain falls. For the Meteorological records of this station the reader is referred to the report of the Director. The remarkably mild climate of Sidney is shown by these records.

FRUITS AND OTHER ECONOMIC PLANTS.

One thousand and sixty-two trees of the following fruits, viz., Cherry, quince, medlar, almond, apricot, peach, plum, pear and apple, orange, filbert and walnut were planted during the spring and 94 per cent are in good condition. They were sprayed several times during the season for aphides. Two shipments of orange trees were received, one from the Department of Agriculture, Washington, all the trees of which died, the others came from Japan, and are doing well.

Black, red and white currants, raspberries, strawberries, Loganberries and blackberries only produced an average crop on account of the plots being under water during the winter months. Of the strawberries, "Magoon" variety produced the best crop. The currants were sprayed several times during the summer for aphides.

A small plantation of *Rhamnus Purshiana* (Cascara) consisting of plants collected in this district was planted during the spring and all have made good growth.

About one-quarter acre of holly trees were planted, most of which are living and making good growth.

All the lavender which was planted last spring is alive and in a good growing condition.

NUMBERS AND VARIETIES OF TREE FRUITS PLANTED, 1914.

Apples.—Twenty-seven varieties with a total of 153 trees as follows: 10 Cox Orange Pippin, 2 Charles Ross, 10 Duchess of Oldenburgh, 2 Delicious, 10 Gravenstein, 12 Grimes Golden, 12 Jonathan, 2 King David, 11 King of Tompkins Co., 7 Lowland Raspberry, 1 Linton, 1 Melba, 2 Mr. Gladstone, 7 McIntosh, 1 Percival, 1 Petrel, 14 Red Astrachan, 2 Rome Beauty, 3 Saint Germain, 2 Sweet Bough, 1 Trenton, 2 Transparante-de-croncels, 13 Wagener, 10 Wealthy, 2 Wismer Dessert, 2 Winter Banana, and 10 Yellow Transparent.

Crab apples.—Three varieties: 3, Florence, 2 Hyslop and 2 Transcendent.

Almonds.—Two varieties, Hard and Soft Shell.

Apricots:—Twelve varieties represented by 23 trees: 2 Blenheim, 1 De Boulbon, 2 Du Chancelier, 4 Hatif du Clos, 2 Gros Saint Jean, 1 Liabaud, 1 Moorpark, 2 Magyar Legjob, 2 Paviot, 2 Superb, 2 Sucré-de-Holub and 2 St. Ambroise.

Sweet Cherries.—Thirty-six varieties totalling, 83 trees: 1 Abbesse d'Oignies, 13 Bing, 2 Black Hawk, 2 Belle Magnifique, 2 Beauté de l'Ohio, 1 Belle d'Orleans, 2 Black Tartarian, 1 Belle de Choisy, 1 Choque, 1 de Mézel, 1 d'Annonay, 2 Elton, 1 Emperor François, 3 Empress Eugenie, 1 Früheste der Mark, 1 Gros Blanc, 1 Gros Noir, 2 Gros Rouge, 1 Jaune de Buttner, 2 Jaboulay, 1 Jeffrey Duke, 5 Lambert, 2 May Duke, 3 Marjolet, 2 Napoleon, 2 Pélissier, 1 Pleureur, 2 Pourpre Hâtive, 1 Précoce de Tarascon, 1 Précoce Rivers, 9 Royal Anne, 2 Reine Hortense, 2 Reine Hortense Hâtive, 2 Tardif de Ladé and 7 Windsor.

Sour Cherries.—Sixteen varieties represented by 75 trees: 1 Anglaise Tardive, 3 A Brindilles, 2 Anglaise Hâtive, 2 Belle de Franconville, 1 De Belleu, 11 Early Richmond, 15 English Morello, 2 Gros Gobet, 1 Griotte Acher, 1 Griotte du Nord, 3 Montmorency Brettoneau, 12 Montmorency, 2 Montmorency Pleureur, 2 Nouvelle Royale, 16 Olivet and 1 Pleureur.

Oranges and Hybrids Citrus Fruits.—Nine varieties are included in the 38 citrus trees planted, viz.: 5 Bigaradia, 5 Decumana, 5 Elliptical Fruit, 5 Media Acida, 3 Norton, 3 Round fruit, 1 Savage Seedling, 10 Unshiu, and 1 Willets Seedling.

Medlars.—Three varieties of Medlars represented by 10 trees: 4 De Hollande, 2 Ordinaire and 4 Sans Pépin.

Nectarines.—One tree of each of the following varieties of Nectarines: Boston, Lord Napier and Stanwick.

Standard Pears. Two hundred and fifty pear trees made up of 49 varieties: 40 Anjou, 2 André Desportes, 20 Bosc, 20 Bartlett, 20 Boussock, 2 Beurré d'Avril, 1 Besi de Chaumontel, 1 Beurré Bachelier, 2 Beurré d'Amanlis, 2 Beurré de Naghin, 2 Beurré Diel, 2 Belle Lucrative, 2 Beurré d'Hardenpont, 2 Beurré Giffard, 2 Beurré Hardy, 20 Clairgeau, 2 Charles Ernest, 20 Dr. Jules Guyot, 2 De Curé, 1 Docteur Jules Guyot, 2 Doyenné de Merode, 2 Doyenné d'Alencon, 2 Doyenné d'Hiver, 1 Doyenné du Comice, 1 Duchess d'Angouleme, 2 Emile de Heyst, 2 Easter Beurré, 2 Clapp Favourite, 2 Fondante Thirriot, 2 Flemish Beauty, 2 Jargonelle, 20 Kieffer, 20 Louise Bonne, 2 Le Lectier, 2 Lincoln Coreless, 1 Madame Ballet, 1 Madame Ernest Baltet, 1 Nouvelle Fulvie, 2 Passe-Crassane, 1 Président Deviolaine, 2 Pitmaston Duchess, 2 Princess, 1 Royal Vendee, 1 Souvenir du Congrès, 1 Triomphe de Vienne, 2 Virginie Baltet, 2 Bartlett (Williams), 2 Wilder Early and 2 Vicar of Winkfield.

Dwarf Pears.—Thirty varieties of Dwarf pears with a total of 53 trees: 2 André Desportes, 2 Besi-de-Chaumontel, 2 Beurré Bachelier, 1 Beurré d'Amanlis, 2 Beurré de Naghin, 2 Beurré d'Hardenpont, 1 Beurré Diel, 2 Beurré Giffard, 1 Beurré Hardy, 2 Charles Ernest, 2 De Curé, 2 Docteur Jules Guyot, 2 Doyenné de Merode, 2 Doyenné d'Alencon, 2 Doyenné d'Hiver, 2 Doyenné du Comice, 2 Clapp Favourite, 2 Fondante des Bois, 1 Fondante Thirriot, 1 Louise Bonne d'Avranches, 1 Madame Ballet, 2 Madame Ernest Baltet, 2 Nouvelle Fulvie, 2 Président Deviolaine, 2 Passe-Crassane, 2 Royale Vendee, 2 Souvenir du Congrès, 1 Triomphe de Vienne, 2 Virginie Baltet, 2 Bartlett (Williams).

Peaches.—Six varieties represented by 11 trees: 2 Alexander, 2 Early Crawford, 2 Fitzgerald, 2 Hale Early, 1 Triumph and 2 Yellow St. John.

Plums.—Thirty-two varieties represented by 116 trees: 2 Black Diamond, 2 Bradshaw, 1 Burbank, 2 Columbia, 2 Coe Golden Drop, 2 Drap d'Or, 2 De Létricourt (Prune), 2 De Zimmer (Prune), 3 D'Ebersweier (Prune), 2 English Damson, 2 Greengage, 2 Grand Duke, 17 Italian Prune, 2 Jaune Hâtive de Thoissey, 1 Le plus

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précoce de tous, 2 Maynard, 2 Mallard, 2 Pond Seedling, 4 Précoce de Bühlerthal (Prune), 15 Peach Plum, 1 Minot Prune, 4 German Prune, 15 Reine Claude de Bavay, 1 Silver Prune, 2 Sugar Prune, 2 Santa Rosa, 14 Shropshire Damson, 2 Tragedy Prune, 2 Victoria, 2 Washington, 2 Yellow Egg.

Quinces.—Eight varieties represented by 30 trees: 6 Champion Comina Orange, 4 De Portugal, 4 De Bereckzki, 4 De Bourgeault, 2 De Vranja, 4 Fabre, 3 Ordinare and 3 Pineapple.

OTHER TREE PLANTING.

Other features of the year was the planting of each side of the East Saanich road with *Liriodendron tulipifera* (tulip tree), the main avenue with *Platanus Orientalis* (plane tree) and *Cornus Nuttallii* (native dogwood).

An arboretum 135 feet wide was planted on the north, west and south boundaries, west of the East Saanich road, with many species and varieties both of native and exotic trees and shrubs.

VEGETABLES.

the potatoes grown at Sidney in 1913. Each test was made in 30-foot rows, 2½ feet apart and the tubers 1 foot apart. All the POTATORS.—From the 37 varieties received from Ottawa, 24 varieties from Indian Head and 18 varieties from Agassiz in the spring of 1913, the following tests were made on plots Unmanured and plots Manured with fresh stable Manure ploughed in with varieties were free from disease.

	Total yield per acre.	Ton. Lb. 8 7200 8 7200 8 7200 8 7200 6 1,200 6 1,500
MANURED.	Total.	Lb.
Mar	Un- market- Market- able.	Lb. 2232223322332233223322333233333333333
	Un- market- able.). 000000000000000000000000000000000000
	Total yield per acre.	Ton. Lb. 120. Lb. 120
	Total.	Lb. 258 238 238 238 238 238 238 238 238 238 23
	Un- market- Market- Total. able.	Lb.
	Un- market- able.	при
	Date Harvested.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
UNMANURED.	Date Planted.	May 7 (1984) 1 (1984)
UNN	Seed from in 1913.	Ottawa Agassiz Indian Head Ottawa Agassiz Indian Head Ottawa Agassiz Indian Head Agassiz Indian Head Indian Head Ottawa Ottawa Ottawa Indian Head Ottawa Indian Head Ottawa Indian Head Ottawa Indian Head
	Variety.	Dalmeny Hero The Eactor Conquering Hero Bappire State Dalmeny Beauty Table Talk Houlton Rose. Everett Late Puritan.

VEGETABLES.

Beans.—Beans were planted on May 23 in rows 30 feet long and 30 inches apart and 2 inches in the rows. Plants were up on June 3 and commenced to bloom on July 6. Bountiful and Refugee or 1,000 to 1 gave the best results. Eight varieties were grown, but the yield was below average.

Beets.—Seven varieties of beets were sown on April 24 in rows 30 feet long and 30 inches apart, germinating on May 4; afterwards they were thinned to 2 and 4 inches apart, being ready for use on July 13, the heaviest cropper being Egyptian Dark Red, there being no difference in quality of the seven varieties.

Brussels Sprouts.—Seed was sown on May 21, plants were up on the 24th, and planted out on June 25 in rows 30 feet long and 30 by 24 inches apart. They were late in coming into condition on account of the undrained condition of the soil and the period of drought which followed their transplanting.

Cabbage.—Seed was sown May 21 and pricked out on June 15. Planting took place on June 25 in rows 30 feet long and 30 inches apart (Early, 18 inches and winter, 24 inches apart in the rows). The crop was very small owing to the same conditions as affected the Brussels sprouts.

An experiment was conducted in order to find out the effect of magget on pricked out and unpricked out plants. The plants that had been pricked out were not attacked by the magget, but many of the unpricked out plants were lost through this pest.

Carrots.—Two varieties of carrots were sown on April 20 in rows 30 feet long and 30 inches apart, germinating May 1. They were thinned to distances of 2 and 4 inches and harvested October 13. Chantenay was the best cropper of the two, there being no difference in those thinned at 2 and 4 inches. Early Half Long Scarlet Nantes gave a better crop when thinned to 4 inches.

Cauliflower.—A very poor crop was harvested through the same cause as affected cabbage and Brussels sprouts. They were planted in rows 30 feet long and 30 by 18 inches apart.

Corn.—Eleven varieties of sweet corn were sown on May 22, the following six varieties producing the best crops. All were planted in rows 30 feet long and in hills 3 feet by 3 feet apart.

Variety.	Ready for use.	Yield per 12 hills.	
Early Malcolm. Metropolitan. Pocahontas. Early Fordhook Early Iowa. Malakoff.	Aug. 31 Sept. 13 ' 13 Aug. 31 " 31 Sept. 13	Lb. Oz. 20 3 19 14 19 1 17 12 13 8 19 8	

An experiment was carried out to ascertain the cropping value of topped and untopped corn. The plants were topped after flowering by the flowering spike being pinched out when about 4 feet 6 inches in height; the result will be seen from the following table:— .

Variety.	Yield 1:	2 hills	Yield 1	
Early Malcolm Metropolitan Pocahontas Early Fordhook Early Iowa Malakoff	Lb. 20 19 19 17 13.	Oz. 3 4 1 12 8 8	Lb. 22 13 15 20 13 23	Oz. 10 14 9 12 2 4

Cucumbers.—On May 22 five varieties of cucumbers were sown in the open, Prize Pickling being ready for use on August 15, the remainder coming in on the 22nd of the same month. The best results were obtained from Giant Pera and Peerless White Spine. They were planted in hills 6 feet by 6 feet apart.

Lettuce.—Ten varieties of lettuce were planted, all of which did well. Dark Green Capucine, a Cos variety, All Heart, Unrivalled Summer and Iceberg gave the best crops. As regards quality, the curled leaf varieties were the best.

Onions.—Seven varieties of onions were sown on April 20 in 30-foot rows, 15 inches apart and then thinned to 2 and 4 inches apart, but did not produce a very good crop, the best variety being Red Globe with Dark Red Beauty second.

Parsley.—Double Curled parsley was sown on April 20 in rows 30 feet long, and was ready for use by July 6; it grew well, attaining a height of 1 foot.

Parsnips.—Seed of Intermediate and Improved Hollow Crown parsnip was sown on April 20 in 30 foot rows, 30 inches apart and thinned to 2 and 4 inches. Those at 4 inches produced the best results, Hollow Crown gave a better return than Intermediate.

Peas.—Fifteen varieties of garden peas were sown on April 20 in 30-foot rows, 3 feet apart. Plants were up on April 30, and were ready for use on June 26. The crop was small, the best varieties being Gradus, Heroine, and Early Giant for weight, whilst Quite Content gave the best results for size and quality.

Radish.—Seed was sown on June 29 in 30-foot rows, 15 inches apart. Varieties tested were Early Scarlet White Tipped and Forcing Scarlet Turnip and both gave good results and were quite free from maggets.

Salsify.—Long White salsify was sown in 30-foot rows on April 20, the plants were up on May 1 and thinned to 2 and 4 inches apart, those at 2 inches giving the best result. The crop being an average one, was harvested November 21.

Squash,—Ten varieties were sown in the open on May 22, 9 feet apart each way. Plants were up on June 8 and commenced to flower on July 16, being ready for use on August 15. The general condition of the crop was good although below the average. Long Vegetable Marrow, Delicious, Delicata and White Bush Scallop, and Custard Marrow gave the best returns.

Tomatoes.—Seed of 18 varieties was sown in hotbeds on April 15, germinating on the 24th of the same month. They were pricked out on May 6 and transplanted to open ground on June 8, in rows 4 feet by 4 feet. They commenced to bloom on the 20th of June and were ready for use August 22, the final picking of the fruit being on October 3.

The experiment on the Bush and Single Stem system has been carried on from

1913 with the following results.

Ten plants of each variety were planted, five being allowed to grow on the Bush and five on the Single Stem system:—

BUSH SYSTEM.

Variety.	Ready for use.		Weigh Rip Fru	oe	Weigh Unrij Frui	pe	Tots	al.
N. Adirondack G. No. 1 Extremely Early IXL Earliana, Sunnybrook Alacrity Earliest Round XXX Jack Rose.	66	22 22 29 22 22 22 29	Lb. 13 12 8 11 8 7	oz. 12 5 12 5 5 2	Lb. 22 24 21 18 22 22 22	02. 00 00 00 00 00 00	Lb. 35 36 29 29 30 29	oz. 12 2 15 5 2

SINGLE STEM SYSTEM.

Turnips.—The seed of three varieties was sown on May 27 in 30-foot rows, 15 inches apart. Plants were up June 2 and were thinned to 2 and 4 inches. Those at 4 inches gave the best results, Early White Flat Strap Leaved being the best variety and was ready for use on August 22.

BULBS.

About 5,000 bulbs were imported and planted on the Station consisting of daffodils, tulips, crocus, etc., from Holland and made a good display during the months of April and May.

Of special attraction were the gladoli from Ottawa which were in full bloom in

August, showing the climate and soil is adaptable for bulb growing.

The following annuals were sown in the hotbed on the 14th of April, and set out in the open on the 15th of May, most of them being in bloom until the 1st of November.

	1	1
Name of Variety.	Number of Varieties.	Date commenced to bloom.
Alonsoa Warscewiczii compacta. Asters. Asters. Antirrhinum Amaranthus tricolor splendens. Alyssum Ammobium alatum grandiflorum Aeroelinium roseum Balsam. Bartonia aurea. Coreopsis. Coreopsis. Chrysanthemum Centranthus macrosiphon Candytuft. Clarkia elegans. Carnation, marguerite. Coxomb mixed. Cosmos bipinnata. Dianthus Heddewigii. Dimorphotheca aurantiaca. Daisy. Eschscholtzia. Godetia. Gypsophila elegans. Helichrysum, scarlet. Jacobaa. Kochia trichophylla. Leptosiphon hybridus. Linum rubrum Marigold. Nemesia. Nicotiana affinis mixed. Nasturtium Portulaca. Pholx Drummondii. Poppy, mixed. Ponsaise.	of Varieties. 1 20 17 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	commenced to bloom. Aug. 8. " 10. July 27. June 10. July 20. " 14. June 30. " 30. July 20. " 6. " 18. Aug. 24. June 24. July 6. July 6. July 20. " 6. Aug. 24. July 6. July 20. " 6. " 6. July 20. " 30. July 20. " 30. July 20.
Ricinus Bronze King Rodanthe maculata a' a Sweet Peas. Swan River Daisy Salpiglossis. Sweet Scabious Verbena. Xeranthemum annuum superbissimum	1 A 1 June 1 A 1 2 1 1 A 1 5 June 1 A	une 30. ug. 31. uly 27. " 6 " 6. " 14. " 20. une 30. ug. 4. uly 6.

REPORTS OF EXPERIMENTS ON THE FRUIT FARM OF THOS. A. SHARPE, SALMON ARM, B.C.

The autumn of 1913 was dry and warm until its close, at Salmon Arm, and with the commencement of the winter the soil was quite dry for a depth beyond ordinary ploughing. The ground froze before it was covered with snow, an unusual occurrence in this district, and when the snow melted in the spring most of the water ran off owing to the frozen ground. The spring rains were unusually light and the summer very dry. The result of this drought was a light fruit crop, especially of blackcaps and blackberries, which more or less dried on the bushes.

The potatoes and other root crops were below average in yield, and rain in the latter part of the summer caused a second growth of the potatoes to take place, which

while it added to the yields lowered the standard of quality.

On this farm the experimental orchard gave only a medium yield of fruit. The following varieties have either been removed, or when the variety is a vigorous grower the tree will be top-grafted to some other variety, as the fruit has been found after four seasons to be too small to be of commercial value: Jewetts Best, Ferris, Piedmont, Swayzie. A number of the young pear trees bloomed last year, but only two varieties fruited, namely, Dr. Jules Guyot and Flemish Beauty; both varieties are of fine appearance and very good quality. Three varieties of cherries fruited. Olivet, de Planchoury and Von der Nette, all of the sour family, and as our cherries come on the market when the crop from farther south is mostly off the market, prices and demand are good. There were no new varieties of plums fruited this year. Four varieties of grapes fruited, Saunders seedling, Goethe, Delaware and Brighton. All ripened fully before frost.

In garden or table corn the Malakoff, Cory and Golden Bantam are the most

satisfactory of those tested up to date.

Tomatoes do very well, and the selected strain of Earliana seed sent out by the Central Experimental Farm has given very satisfactory returns, the plants being vigorous and productive, the fruit early in ripening, of superior quality and uniformly smooth.

SUBSTATIONS.

FORT VERMILION, PEACE RIVER DISTRICT, ALBERTA.

This substation is situated in the valley of the Peace river in latitude 58° 36′. It is over three hundred miles north of Edmonton, and is in charge of Mr. Robert Jones, who has prepared the following report:—

The horticultural work in 1914 has, it is believed, been of considerable value in giving information needed in this district, and while the season was unfavourable part of the time, on the whole it was a favourable one and some good results were obtained.

April opened rough and continued so until the 20th, when it got milder and what was thought at first would be a very late spring turned out to be an average one for earliness, and it was possible to get the hotbeds under way by the 22nd. The ground dried off very quickly, and a start was made at seeding grain on April 30. May opened fine, and work progressed nicely. The month of May was very dry, with considerable winds. The rainfall was very light in May, it raining on only three occasions, namely on the 17th, 0.6 inch fell; and on the 25th, 0.3 inch, and on the 26th 0.5 inch. On account of considerable moisture in the soil from the winter snow, some seeds that were sown early germinated very quickly. June also opened fine and was a splendid month for growth of all plants, although the precipitation was very light. One timely rain occurred on the 3rd and 5th of the month. The rain brought the crops along very rapidly. July opened very hot, with considerably more rain than usual, which was very much needed at this time. Having commenced on the 15th. Wild hav was quite plentiful, and by this time some of the grain was commencing to change colour. The precipitation for July was 13 inches. The small fruits at the station were ripe on the 22nd, when picking commenced; the berries were small but very plentiful. Raspberries were not ripe until the end of the month. By this time all the flowers were in bloom. August opened showery and continued so throughout the month. August was quite warm throughout the month and on only two occasions did the temperature fall to the freezing point. On the 23rd the thermometer registered 31.2° F., and on the following morning 31.4°. The balance of the month was quite warm. Haying was not finished until the 22nd. September was a pleasant month, and advantage was taken of the fine weather to hurry work along. The first killing frost of the season occurred on the night of the 7th, when we had 71 degrees of frost. The balance of the month was much milder. On September 10, the digging of potatoes was begun. Ploughing started on the 15th, with ground quite dry. By the end of the month fall work was pretty well along. Some extra work was done at the Station in moving the fence on the east and south side to make more room for both the horticultural and agricultural work, as with the large number of seedlings coming on, and with these to transplant, the 5-acre plot was found too small, and by moving the fence, 3 more acres have been taken in. October opened very fine, and has remained so up to the 14th, when this report closes. The days have been quite bright with cool nights. A large percentage of the fall ploughing has been done to date. The results of this season's work have been most successful.

APPLES AND PLUMS.

The apple trees have recovered somewhat from the severe killing back from the winter of 1913-14 which some of them experienced, and have made good growth during the past summer. The apple seedlings planted during the spring of 1914 have done very well and made good growth during the summer and are in good condition for winter.

STRAWBERRIES.

The strawberries raised from seed of cultivated varieties are doing well and if they come through the winter there will be quite a number for next spring.

CURRANTS AND RASPBERRIES.

The currants did very well. Two hundred and sixty-nine pints were picked. The raspberries were also a good crop and were quite large. The plot of Herbert yielded 50 pints and the plot of Heebner 59 pints. The season lasted from August 13 to August 24.

YIELDS OF CURRANTS.

Number of Bushes.	Varieties Tested.	Yield.
,		Pints.
lack:	Bang Up	` 11
2	Norton	11
2	Kerry	11
2	Climax	11
2	Topsy	11
2	Eclipse	11
2	Magnus.	îî
2	Saunders	11
	Ethel	11
2		11 .
2	Ontario	11
2	Eagle	11
≩cd:		
	Simcoe	12
2	Rankins Red	12
2	. Greenfield.	12
2	Moore Seedling	12
2	Goliath	12
	Red Dutch	12
$\frac{2}{2}$	Large Red	12
2	Long Bunched Holland	12
2	Cumberland	12
2.	Cumberiand	12
White:		
2	Large White	$7\frac{1}{2}$
2	White Grape	71/2
2	White Cherry	71
2	White Kaiser.	$7\frac{1}{2}$ $7\frac{1}{2}$ $7\frac{1}{2}$ $7\frac{1}{2}$ $7\frac{1}{2}$ $7\frac{1}{2}$
	White Dutch	7½
2	_	
	Total	267

Picked from July 22nd until July 31st.

POTATOES.

The potato crop was very good in this district this year as the farmers endeavoured to get their potatoes planted as quickly as possible in the spring. Five varieties were tested at the Station this season. All the potatoes were planted on land that was in wheat in the season of 1913 and treated with an ample supply of manure at the rate of twenty wagon loads per acre, ploughed very deeply, well harrowed in the spring and furrows made three feet apart. Each plot was one-sixtieth of an acre.

There was no injury from rot in any of the plots and the tubers were almost uniformly large. Below are the results obtained. A larger field plot of Early Rose gave a yield of 320 bushels of medium sized potatoes. No potato bugs are as yet in the North Land.

POTATOES-Test of Varieties.

Name of variety.	Character of growth.	Average size.	Total yield per acre.		yield per		yield per		yield per		yield per		yield per		yield per		yield When per planted.		Form and colour.
Rochester Rose Carman No. 1 Gold Coin. Irish Cobbler. Early Rose.	Rank Very rank Fair	Large Ve.y la ge Medium	Bush. 319- 367 441 210 271	28 12 20 24 37	April 30 " 29 " 30 " 30	" 11 " 11	Long, pink. Flat, white. Round, white. Round, white. Round, pink.												

GARDEN CORN.

Four varieties of garden corn were tested at the Station this year. These four varieties were planted in plots of \(\frac{1}{30} \)-acre on May 4, and all cut on September 10. It was planted in hills two and a half by three feet apart on land that was in summer fallow the previous year. All of these plots of corn were cultivated a number of times to encourage the growth and to prevent the evaporation of moisture from the soil during the very dry spell in May and June.

The following were the results obtained:-

				-			
Name of variety.	Height.	Leafiness.	When tasseled.	In silk.	When in use.	Condition when cut.	Weight per acre grown hills.
White Squaw	Inches. 48 50 40 36	Very leafy Leafy Fairly leafy Fairly leafy	" 18 " 20	Aug. 4	Sept. 4 5	Sept. 4, ripe. Early dough Early milk Sept. 4, ripe	11 1400

Onions-Test of Varieties.

Four varieties of onions sown in open ground on. May 6. Onions of medium size. The yield was estimated from 12 rows each 33 feet in length. The rows were 18 inches apart. The onions were taken up September 8.

		1	
Variety.	In use.	Yield pe	r acre.
White Barletta. Early Flat Red Wethersfield. Large Red Wethersfield Danvers Yellow Globe.	July 16 " 15 " 18 " 20	Bush. 129 227 260 248	1b. 20 20 40 00

GARDEN CARROTS.

Garden carrots sown in open ground on May 7, harvested on September 9, 12 rows of each 33 feet in length.

		1	
Variety.	In use.	Yield per	r acre.
		Bush.	lb.
Extra Early Horn	July 15	430 480	12 00

GARDEN PEAS-Sown May 8.

The garden peas did not grow quite as rank as usual. The vines averaged from 18 inches to 24 inches and the pods from 2 inches to 3 inches in length. The average number of peas in a pod was from 5 to 7. All peas ripened off very quickly on account of insufficient moisture. Peas of good quality.

Variety.	In use.	Ripe.
1. Stratagem. 2. Witham Wonder. 3. Admiral Dewey. 4. Henderson First. 5. Gradus. 6. Gregory Surprise. 7. American Wonder. 8. Dwarf Telephone 9. Premium Gem.	July 13 " 20 " 20 " 20 " 6 " 15 " 8 " 16 " 16	July 24 " 30 Aug. 7 July 21 " 31 " 22 Aug. 4 " 6 July 22

ENGLISH WONDER PEAS.

Sown on May 7, one row 33 feet in length fit for use July 11, ripe and picked on August 4. Seed of this variety was sent from Ottawa, spring of 1914. The yield from this one row will be kept for seed for next spring as this pea seems to be a very fine pea and quite productive and early.

EXPERIMENTS WITH OTHER GARDEN VEGETABLES.

Asparagus.—Asparagus from an old bed of Columbia White in use from May 22 until August. Quite large and of fine quality.

Rhubarb.—Rhubarb from the older beds of Victoria in use from May 20 until the first part of September, and then what was left was taken and made into jam for winter use.

Celery.—Paris Golden Yellow, White Plume and Golden Self Blanching were sown under glass on April 22. These were sown later than usual on account of considerable water settling in the hotbeds from the previous autumn rains. The three varieties were transplanted out on June 4 in pits 16 inches deep with about 5 inches of manure

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at the bottom of same, and 3 inches of earth on top of the manure. Celery was only a moderate success. White Plume was the best.

White Plume, in use August 15, medium in size. Paris Golden Yellow, in use August 20, small.

Golden Self Blanching, in use August 25, very small.

Beans.—Challenge Black Wax planted on May 6, in use (green) July 21, ripe on September 3. Very fine as a table bean.

· Early Red Valentine planted on May 6, in use July 29. None of these ripened,

as they were quite green when the frost occurred on the night of September 7.

Golden Wax, sown on May 11, in use July 15. Ripe and picked on September 3. This variety has matured with us for a number of seasons. Yield from 3 rows 33 feet in length, forty-eight hills, 15 pounds.

Dwarf Black Wax sown on May 11, in use July 20, ripe on September 5.

Table Beets.—Early Eclipse sown on May 6, fit for use on July 16, harvested on September 9, quite large and of fine quality. Sown in rows 20 inches apart and the plants thinned out to about 6 inches in the row. Yield from the twelve rows, 485 pounds.

Parsnips.—Hollow Crown sown on May 6, in use August 14, pulled on September 9, very small in size, yield from six rows 33 feet long, 80 pounds.

Table Turnip.—Early White Milan sown on May 7, resown on May 27, the first sowing having been destroyed by insects. In use July 23, very small, harvested on September 9, yield from four rows 33 feet long, 22 inches apart, and plants thinned out to 10 inches apart in the rows, 186 pounds. Roots small. All table turnips had the same treatment.

Golden Ball sown on May 7, resown on May 27. In use July 20, quite small, harvested on September 9.

White Stone sown on May 7, in use July 24, harvested on September 9, roots very small.

Radish.—Scarlet White Tipped sown May 6, in use June 3, very fine and of good quality. The second sowing on July 6 was all destroyed by worms.

Rosy Gem sown on May 6, in use June 4, very good.

French Breakfast sown on May 6, in use June 1, of good quality.

Lettuce.—Iceberg sown on May 6, in use May 29, very fine heads and quite large. The second sowing was done on July 6, in use August 12. Heads from the second sowing became very large. Three rows of each variety, 33 feet long.

Black Seeded Simpson sown on May 6, in use August 1, very fine.

Grand Rapids sown on May 6, in use June 4, resown on May 27, in use July 4, and sown again on July 6, in use August 10. This is a very fine lettuce being very crisp and tender.

New York sown on May 6, in use June 4, very good.

Parsley.—Exquisite Dwarf sown on May 6, in use June 3, very good quality. Taken up on September 9. 36 pounds from 3 rows 33 feet in length.

For the citrons, muskmelons, cucumbers, squashes and pumpkins I have used the same methods that I have followed for the past two seasons with the best of success. As this is the first season I have grown pumpkins I am more than pleased with the results obtained. All planted in hills 6 by 6 feet apart.

Citrons.—Four hills of these were planted on April 27, and four hills on May 4; one hundred fine citrons picked from the eight hills on September 8; average, 5 pounds.

Muskinelon.—Emerald Gem. four hills planted on May 4; thirteen muskinelons picked on September 8; average weight, 14 pounds, none ripe enough for seed.

Hackensack, four hills planted on May 4, picked on September 8; 9 melons, average weight 1 pound, not matured.

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Cucumber.—High Grade White Spine, four hills planted on April 29; in use August 10; forty-four cucumbers picked on September 8, average 1 pound each.

Chicago Pickling four hills planted on April 29; in use July 30; fifty-five cucumbers picked on September 8, average weight 1 pound. Cucumbers this size were a wonder to a good many visitors to the Station.

Squash.—Long White Bush Marrow, six hills planted on May 6; in use August 3; fifty-six marrows picked on September 8; average weight 12 pounds, very fine flavour. These have been used for preserving.

Summer Crookneck, five hills planted on May 6; in use August 6; forty-eight

squash picked on September 8; average weight, 3 pounds.

Pumpkins.—Large Connecticut Field, five hills planted on May 3 in hills 6 feet apart; 41 pumpkins picked September 8; average weight 20 pounds, fully matured and of excellent quality.

Sugar, five hills planted on May 6; in use August 20; fifty-two pumpkins picked on September 8 very fine and sweet and fully matured; average weight 9 pounds.

This seems to be a smaller variety than the Connecticut Field.

Cauliflower.—Cauliflower and cabbage were somewhat smaller than usual. I was somewhat later in getting the seed sown in the hotbeds, and through the press of other work I was somewhat later in getting the plants out, as the transplanting came in the very driest part of the season. All taken up on October 6.

High Grade Dwarf Early Erfurt sown under glass on April 21; transplanted in the open ground on May 29 to June 2; in use August 7; average weight 5 pounds.

Quality good, all taken up on October 6.

Paris, sown under glass April 22, transplanted out in the open ground on June 2: in use August 10; average weight 7 pounds; very fine and tender.

Cabbage.—Copenhagen Market sown under glass on April 21, transplanted to the open ground May 29; in use on August 11; average weight 11 pounds; heads very solid.

Early Paris Market, sown under glass on April 21; transplanted to the open ground on June 2; average weight 6½ pounds; heads quite firm and good.

Danish Ballhead sown under glass on April 21; transplanted to the open ground

on May 28; average weight 13 pounds; heads quite solid and finely flavoured.

Larly Jersey Wakefield, sown under glass on April 22; transplanted to the open ground on May 28; in use July 28; average weight 7 pounds; heads rather loose but very good in flavour.

Red Rock sown under glass on April 22; 50 plants transplanted to open ground on May 28; in use August 22; average weight 5½ pounds; heads very firm; a fine

pickling variety.

Broccoli.—Sown under glass on April 22; twenty-two plants transplanted to the open ground on May 21; in use August 12; very fine.

Tomatoes.—Seeds of all varieties were sown under glass on April 23 and transplanted to the open ground on June 2. Tomatoes did remarkably well this season and were much more successful than other seasons, with a larger percentage of ripe fruit. Many visitors to the Station were astonished at our being able to pick ripe tomatoes from the vines on the Peace river, as this was thought impossible, and they have now come to the conclusion that seeing is believing.

Alacrity No. 2-24-9 sown under glass on April 23; forty plants were transplanted to the open ground on June 2; picked on September 6; yield from the forty plants

was 150 pounds, 50 pounds of which fully matured.

Alacrity No. 2-24-10 sown under glass on April 23; forty plants were transplanted to the open ground on June 4; picked on September 16; yield from the forty plants was 148 pounds, 60 pounds being fully ripened, and the balance fairly ripe.

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Sparks Earliana C. E. F. Strain sown under glass on April 24; twenty plants were transplanted to the open ground on June 3; picked on September 7; yield from the twenty plants; 96 pounds of fairly ripe tomatoes.

Atlantic Prize sown under glass on April 23; ten plants transplanted to the open

ground on June 3; 31 pounds of green tomatoes picked on September 7.

Alacrity. I received from the Horticultural Division at Ottawa on May 6, 1914, one small packet of Alacrity tomato seed. The seeds were sown under glass on the evening of May 6, transplanted to the open ground on June 25. The plants were very small when set out. Tomatoes were very small when the frost occurred on September 7. As this is a very unequal test on account of the difference in time of the sowing of the different varieties, it will take another season to make any comparison, but I think with an equal start Alacrity 1914 will be as early and as productive.

SHRUBS.

The great number of varieties of flowering shrubs which succeed at Fort Vermilion is a surprise to visitors from farther south, who think that it is difficult to grow such things here.

In 1914 the Siberian pea tree, Caragana arborescens, was in bloom on May 27, C. grandiflora on May 29, and C. pygmaea on June 5. The lilacs began blooming on June 8, when the variety Charles X was in flower. This was followed by many other varieties of the common lilac; Himalayan or Chinese lilac, Syringa villosa was in bloom on June 16, and the lilac season was closed by the Japanese tree lilac Syringa japonica which was in bloom on June 26. The white flowered Japanese rose, Rosa rugosa alba was in bloom on June 22.

FLOWER GARDEN.

This year the flower garden succeeded remarkably well and the bloom was good until the last part of September and many of the plants were still in bloom October 14 when the report was sent in. The seeds of tender sorts were sown in the hotbeds on April 24 and the plants were set out in open ground from May 30 to June 15. The more hardy sorts were sown in the open on May 22.

This season produced the finest pansies I have had. The varieties worthy of special mention are Lord Beaconsfield, Giant Trimardeau and Giant White.

Some of the flowers especially worthy of note with dates of blooming are:-

Varieties.	When in bloom.	Remarks.
Aster, Semple Branching. Balsam, Camellia Flowered Antirrhinum (Snap Dragon) Giant Flowering. Antirrhinum, Tom Thumb White. Phlox Drummondii. Stocks Verbena (Hybrida). Zinnia. Petunia. Nicotiama affinis). Sweet Peas (Augli) Sweet Peas (Cupid mixed). Poppies, (Shirley poppy).	July 24. " 18. " 20. " 9. " 29. June 30. " 26. July 14. " 23. " 21.	Very good.

The flower garden was greatly admired by the many visitors that saw it this summer, not only the flowers themselves, but also as regards the artistic way in which it was laid out.

GROUARD, LESSER SLAVE LAKE, ALTA.

The report which follows was prepared by Brother Laurent, O.M.I., the mission with which he is connected having charge of the work at Grouard.

The summer and autumn of 1913 having been very wet, it was not possible to put any work on the land for the following season. In consequence, on April 18, 1914, when the soil was sufficiently thawed out, we harrowed five times in order to get the land ready for sowing at the normal time. Conditions in May were favourable to the germination of the seed. June was also a good month for growth.

The following varieties of vegetables were sown in hotbeds during the first week of April:—

Cabbage and Cauliflower.—Early cabbage—Early Jersey Wakefield, Etampes, Early Spring, Paris; later cabbage—Improved Brunswick, Schweinfurt, Danish Copenhagen Market. Cauliflower—Maltais and Early Snowball. All the cabbage were transplanted to the garden the first week of June, and the early varieties were ready for the table July 15. The cauliflowers were ready for use on August 1. The later cabbage succeeded well, considering that the land where they were received no manure. The Danish and Copenhagen Market gave very fine hard heads, weighing on the average 20 pounds each.

Celery.—Sown during the first days of April, and transplanted to the garden the first week of June, the varieties tested being White Plume. Paris Golden Yellow, and Giant Pascal. The first two are to be preferred for this district, the last variety being too late. The first plants of celery were ready for the table the end of August.

Tomatoes.—Sown under glass on March 15, and transplanted in the frame in three weeks to a month, and finally planted in the garden on June 5. The plants yielded abundantly. Chalk Early Jewel did very well and yielded an abundance of fine, almost smooth fruit. The first fruits were ripe on August 10. The average weight of fruit from each plant was 14 pounds, there being 360 pounds harvested the first week of September.

Squash.—The variety Long White English Vegetable Marrow sown in pots under glass at the end of March and transplanted to the garden in hills on June 5, were good for the table on August 10. The average weight of a specimen was 10 pounds. Mammoth Squash and Pumpkins with the same culture were harvested the first week of September, the former weighing 56 pounds and the latter 32 pounds each.

Peas.—Alaska, sown April 30, was ready for the table on July 10, and is a very good early pea. Thos. Laxton, sown May 15, was ready for eating July 25, and Stratagem, sown in May, was ready for the table at the end of July, and is a good sweet pea with large pods.

Beans.—Two varieties of butter beans were tested, but the results were not satisfactory. They were, evidently, wrongly named.

Turnips.—The Early Milan turnip grew well enough, but the roots were badly affected with maggots. The Golden Ball was healthier.

Beets.—Eclipse, Fireball, Egyptian, and Dark Red Detroit yielded well. Sown May 10 and were ready for use at the beginning of August.

Lettuce.—Unrivalled and Nonpareil, sown April 30 in the garden, were ready for use in six weeks.

Radish.—Four varieties were tested but gave little satisfaction, as the white magget spoiled the roots.

Onions.—Large Red Wethersfield, Yellow Danvers sown in the autumn at the end of October, gave a good return.

Carrots.—Chantenay, Guerande, Nantes, Danvers, all sown in the autumn, also succeeded well. The Danvers is the largest but is the least sweet. The Nantes is of good flavour but is smaller.

FLOWERS.

The following species and varieties were grown in hotbeds early in April: Asters, 6 varieties; antirrhinum, 2 varieties; Phlox Drummondii, alyssum, petunia, pot marigold and French marigold. They were transplanted to the garden the first week of June and commenced to flower at the end of June, and continued in bloom until the end of September. Six varieties of sweet peas 60m in the open on April 2 also gave flowers for a very prolonged period, as did also three varieties of mignonette and twelve of pensies. The Sweet Williams were splendid. The German Iris have not yet flowered. The common lilac and Himalayan or rough-leaved Chinese lilac, Syringa villosa were full of flowers, giving a succession for six weeks.

BUSH FRUITS.

Thirty-six red currant bushes gave a very good yield, each bush producing on the average 5 gallons of excellent fruit, which ripened the first week of August.

ST. BRUNO, MACKENZIE DISTRICT (LATITUDE 60°).

St. Bruno is situated 20 miles west of Fort Smith on the banks of the Salt river or rather on the old river bed. The ground was broken in 1911. Some crops grown in 1914, with the results, are furnished by Father B. Roure.

Potatoes were planted on May 15 and dug on September 8. A half bag planted,

yielded 10 large bags.

Carrots sown May 14 yielded 7 bags of fine roots, the largest weighing a pound each.

Beets sown the same time as the carrots were all good. The largest weighed 5 pounds.

There were 100 cabbages set out on June 4 and all made a good growth, the largest weighing 20 pounds.

Onions were well advanced, the largest weighing half a pound.

There were lettuce and radishes all summer.

Peas were ready for eating near the end of July.

We are satisfied with our little garden.

FORT RESOLUTION (LATITUDE 61° 14').

(The following report was sent by the Rev. Father Duport.)

The winter of 1913-14 was rough and long. It was not until the third week of May that the snow had entirely disappeared. As soon as the snow left the ground was prepared and between May 20 and 30 the different sowings were made under good conditions. Towards the second week of June a fine but abundant rain came and started germination and all the seeds planted with the exception of parsley started wonderfully and there was rapid growth. Numbers of explorers and officers of the government marvelled at the vegetation. August was not very warm and on the 18th some of our plants were affected with frost, but only slightly. From September 15 to the 20th the main harvest took place. On the night of the 22 and 23 the ground was frozen two inches in depth.

Following are some details:-

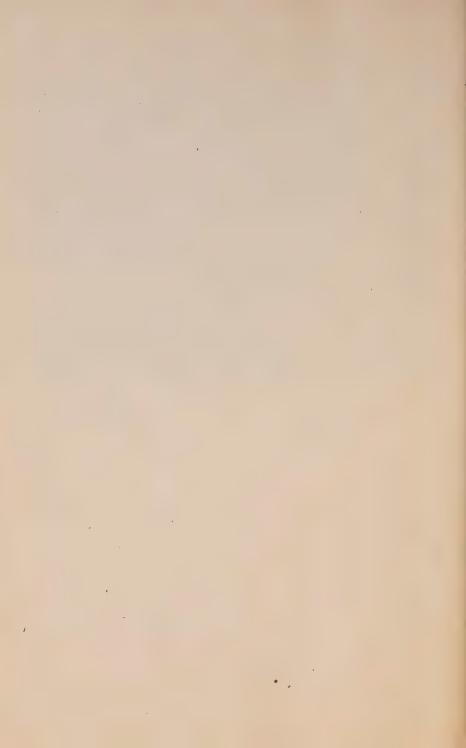
					1	
Variety.	Quantity sown.	Date of planting.	Germina- tion.	Ready to use.	Ripe.	Weight, total.
Potatoes-						Lb.
Reeves Rose						
Rochester RoseVick Extra EarlyEarly Rose	3 rows 2 rows	May 22 " 22 " 22 " 18 & 19	" 14 " 16	August 25 " 15 " 15 " 25	Sept. 22 " 22 " 22 " 18–22.	197 85 80 50,483
Beans— Early Red Valentine Wardwell Kidney Wax	1 row 20 ft	" 22 " 22	" 18 " 18	" 10 " 10	(Did not mature.)	
Hodson Long Pod	"	" 22	" 24	Did not be-	1	
Peas— Gradus Nott Excelsior Thos. Laxton	½ row 10 ft	" 23 " 23 " 23	" 8 " 8	August	Sept. 20	6 5 4
					Harvested.	
Cabbage— Early Jersey Wakefield Premium Flat Dutch Early Winningstadt	44	" 23 " 23 " 23	" 4		Sept. 17 " 17 " 17	6 to 10 4 to 8
Carrots— Danvers Half I ong Early Short Chantenay Danvers Ir proved	"	" 26 " 26 " 26 " 26	" 10 " 12		" 29 " 29	47 40 52 60
Beets— Early I lood Turnip					Sept. 23	80
Lettuce		" 26	" 8	June 25		
Parsley— Moss Curled	"	. 26				

FLOWERS.

Variety.	Date of sowing.	Germination.	Trans-planted.	Blooming season.
Alyssum. Candytuft. Poppies Sweet Peas.	Previous year	Second week of May		Very abundant all summer. " " " " " " " " " " " " " " " " " " "
Marigold. Phlox. Mignonette. Helichrysum. Aster. Stock. Verbena. Siberian Apple Tree. Maple Tree.		" 15	June 8	and beginning of Sept. """" """ Bloomed all month of Aug.

Native Strawberries, cultivated for 3 years—yield from 30 plants, 2 gallons of fruit.

Notes in regard to Potatoes. The Reeves Rose, Rochester Rose, and Vick Extra Early potatoes were received in 1913 from the Experimental Station, Lacombe, Alta. They appear to have become readily acclimatized and their yield has been relatively as good as Early Rose. They are of good quality and size, but not very numerous. The Vick Extra Early is very early but rotted more easily in winter. The Reeves Rose appears to be the most profitable.



Dominion Cerealist, Ottawa, Ont. .

DOMINION OF CANADA , DEPARTMENT OF AGRICULTURE DOMINION EXPERIMENTAL FARM

REPORT

FROM

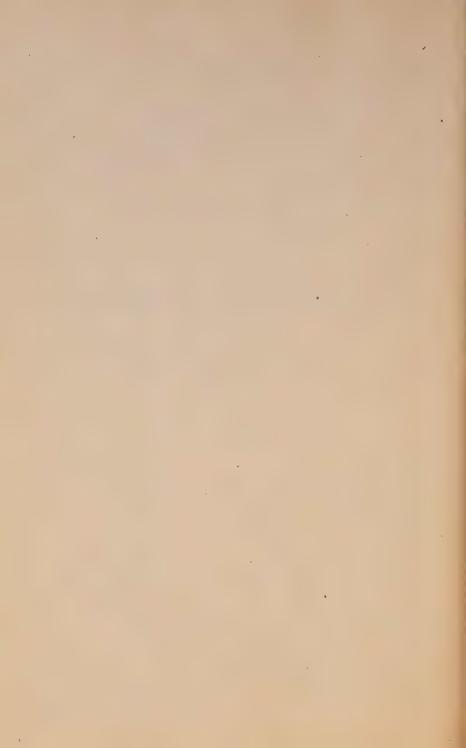
THE CEREAL DIVISION

FOR THE

Fiscal Year Ending March 31, 1915

PREPARED BY

Superintendent-		
Experimental	Station, Charlottetown, P.E.I	J. A. Clark, B.S.A.
Experimental	Farm, Nappan, N.S	W. W. Baird, B.S.A.
Experimental	Station, Kentville, N.S	W. S. Blair.
Experimental	Station, Fredericton, N.B	W. W. Hubbard.
Experimental	Station, Ste. Anne de la Pocatière	Joseph Bégin.
	Station, Cap Rouge, P.Q	
Experimental	Farm, Brandon, Man	W. C. McKillican, B.S.A.
	Farm, Indian Head, Sask	
Experimental	Station, Rosthern, Sask	Wm. A. Munro, B.A., B.S.A.
	Station, Scott, Sask	
	Station, Lethbridge, Alta	
	Station, Lacombe, Alta	
	St. Bernard Mission, Grouard, Alta	
	Grand Prairie, Alta	
	Fort Vermilion, Alta	
Experimentalist,	Fort Resolution, Mackenzie Dist	
	Fort Providence, Mackenzie Dist	
	Farm, Agassiz, B.C	
	Station, Sidney, B.C	Samuel Spencer (Foreman-Mgr.)
1655	865	



REPORT OF THE DOMINI ON CEREALIST

OTTAWA, March 31, 1915.

J. H. GRISDALE, Esq., B. Agr., Director, Dominion Experimental Farms.

Sir,-I have the honour to submit herewith the twelfth annual report of the Cereal Division, giving a short account of the progress, during the past twelve months, of some of the investigations and experiments which are being prosecuted under my direction.

While the season of 1914 was much less favourable for cereals in some parts of the country than the previous year, there were excellent crops in many districts, and the experimental plots on the branch Farms and Stations gave interesting and instructive results.

Owing to the resignation of my chief assistant at the end of January, 1914, there was a vacancy on my staff for several months. In June, a new assistant, Mr. G. Gordon Moe, B.S.A., a graduate of Macdonald College, was appointed. Mr. Moe has taken up his work with enthusiasm and is rendering valuable help to me.

My thanks are due to all the members of my staff, without whose loyal co-operation the work could not be successfully carried on. Mr. R. W. Nichols, my milling and baking assistant, Miss Mary C. Carter, my stenographer, and Mr. George J. Fixter, my foreman, should be particularly mentioned. I am also under obligation this year to Mr., J. McKee of the Horticultural Division, who, by kind permission of Mr. W. T. Macoun, Dominion Horticulturist, conducted a large series of germination tests for me.

Following my own report will be found the reports on cereals written by the Superintendents of the various branch Farms and Stations.

I have the honour to be, sir, Your obedient servant.

> CHARLES E. SAUNDERS. Dominion Cerealist.

CORRESPONDENCE.

The correspondence of the Cereal Division is carried on chiefly during the winter months. The figures as to the number of letters received and despatched during the whole year give very little idea of the amount of work which has to be transacted during the busy season.

Letters received direct	• • • • • • • • • • • • • • • • • • • •	13,301 7,834
Total letters received		21,135 3,337
Letters despatched. French		4/4
Printed letters and circulars despatched		
motal communications despatched		25.439

In order to reduce as much as possible the number of typewritten letters, printed replies are kept on hand, by means of which many hundreds of inquiries are answered every year.

VISITS TO BRANCH FARMS AND STATIONS.

All the branch Farms and all the Stations where cereal experiments are being carried on were inspected by the Dominion Cerealist last summer. Some of the new Stations were also visited in order to plan the work in cereals for future years.

As far as possible these visits of inspection are made during the period between the heading out of grain and the harvest, but in some seasons it is impossible to reach all the Stations at this favourable time.

Arrangements have been made to commence the regular test plots of cereals at Fredericton, N.B., and at Invermere, B.C., this spring.

MARQUIS WHEAT.

Still another triumph has been added to the long series won by this variety. At the International Dry-Farming Congress last autumn at Wichita, Kansas, the highest award for wheat was won by an exhibit of Marquis grown by Mr. Seager Wheeler, of Rosthern, Sask. This is the fourth international victory in succession won by Marquis. Not only has this variety taken the lead in Canada, but it has also made an excellent record in some of the northern states and is proving valuable at high altitudes in Colorado. It would be impossible to give a fair estimate of the value of this wheat to Canada—in dollars per annum—without appearing to exaggerate. It is certainly a question of millions.

PRELUDE AND PIONEER WHEATS.

While these two very early ripening varieties are not likely to mean as much to Canada as Marquis, they are proving valuable in certain sections of the country. The extraordinary earliness of Prelude enables it to escape frost in almost every locality where wheat-growing is attempted. It gives very fair yields, though of course it does not rival Marquis in this respect.

Pioneer is not quite so early as Prelude, but is a little longer in straw, which makes it suitable for some districts where the rainfall is light and where Prelude

ATTANTA

ABUNDANCE OATS.

In past years Abundance oats have been recommended as about equal in value to the old standard sort, Banner. Without endorsing any of the remarkable claims that have been made in favour of Abundance, it must be admitted that it has shown itself a very good variety. But after careful tests for several years on a number of farms, enough evidence has been accumulated to show that in spite of its excellent qualities this oat is not superior in any point to Banner, and is indeed usually a little inferior to it. The so-called "Regenerated Abundance" has not shown any material difference from the older stock. In my opinion, Abundance has now been sufficiently tested and may safely be dropped in favour of its great rival, Banner. A new variety which cannot show at least one point of decided excellence over the best of the old sorts has no just claim for recognition.

NUMBERS FOR NEW VARIETIES OF CEREALS.

The practice of numbering new varieties and selections of grain, instead of giving them names, when introducing them to the public, originated, I believe, at the Minnesota Experiment Station about twenty years ago. Since that time it has been adopted by other institutions and has now become quite popular. This system has obvious advantages from the point of view of the experiment station. It keeps the name and work of the Station well to the front and saves the trouble of choosing good names. The disadvantages are, however, very great. Numbers are always difficult to remember and easy to alter by mistake. Besides, when one is dealing with a selected strain of an old and well known variety of grain, it is quite unfair to the public—to say the least—to drop the original name of the variety, and thus hide the identity of the selected strain, which often differs scarcely at all from the parent sort.

For instance, a selection from the common kind of spring wheat, Blue Stem, was introduced under the name Haynes' Blue Stem. Such a designation was rational and satisfactory, retaining as it did the name of the variety and the name of the experimentalist who made the selection. But when a further selection was made from this and was-introduced as "Minnesota No. 169," the fact that it was still essentially the old, familiar Blue Stem—with its serious defects of lateness and liability to rust—was obscured, and the public was given the false impression that a remarkable discovery of a new wheat had been made. Such a false impression was of course not intended, but it was inevitable in the system of numbering adopted. This latter objection is not applicable where an actual new variety, produced by cross-breeding, is being introduced; but even then the use of a number, without a name, is primitive and unsatisfactory.

Of late years these numbers have come into such general use that any institution which does not employ them is in danger of giving the impression that it has accomplished very little and has no new varieties or selections to its credit. It therefore seems necessary to adopt this system, in a modified form however, in connection with the cereal breeding work carried on at Ottawa by the Dominion Cerealist. The writer has assigned numbers to all the more important cross-bred varieties and selections which he has introduced. Some of these are of his own breeding, and all the others are his selections from earlier cross-bred sorts or from commercial varieties. These numbers are to be regarded as an addition to rather than a substitute for the rames, which will be carefully retained.

In order to avoid an absurdly long designation, only the word "Ottawa" is prefixed to the number, the words "Central Experimental Farm Number" being understood. The numbers adopted do not follow each other regularly, because the system

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of records for cross-bred varieties which has been in use for many years has indicated to a certain extent the numbers which should be adopted.

The following list includes all the sorts to which Ottawa numbers have thus far been assigned. A few of the varieties here mentioned have lately been dropped from the lists of recommended sorts, but they are all good. Many of them are the leading varieties before the public to-day:—

SPRING WHEAT.

	2
Old Designation.	New Designation.
White Fife, Selection C Yellow Cross. Marquis. Early Red Fife. Red Fife, Selection H. Early Russion. Prelude.	Percy, Ottawa 2.
	OATS.
Daubeney Selected	Eighty Day, Ottawa 42. Daubeney, Ottawa 47. Banner, Ottawa 49. BARLEY, 6-ROW.
Manchurian, Selection A	Manchurian, Ottawa 50.
	BARLEY, 2-ROW.
Early Chevalier	Early Chevalier, Ottawa 51.
	SPRING RYE.
Ottawa Select	Select, Ottawa 12.
-	WINTER RYE.
Dominion	Dominion, Ottawa 13.
	PEAS.
Arthur Selected	Arthur, Ottawa 18.
	FLAX.
Longstem	Longstem, Ottawa 52. Novelty, Ottawa 53.

ORIGIN OF VARIETIES.

A few words of explanation in regard to the origin of some of the varieties seem desirable. About half of those mentioned are new cross-bred sorts, while the remainder are selections from old varieties.

Early Red Fife wheat is a distinct selection from Red Fife, easily recognized and ripening usually about a week before the ordinary type. Unfortunately this advantage is accompanied by a greater susceptibility to rust in some climates. However, Early Red Fife has an excellent record in the drier parts of Saskatchewan and Alberta.

Early Russian wheat is a selection from a variety of Russian origin. It is similar to White Russian in some respects but ripens earlier.

OTTAWA.

The Eighty Day oat is a selection from the commercial oat commonly called Sixty Day or Orloff. The selected strain is fully as early as the parent. It ripens in about eighty days at Ottawa. It has short straw and small kernels but usually gives a very fair crop. It is of particular value in cases where great earliness is essential.

Manchurian barley is a selection from Mensury.

Early Chevalier barley is an early ripening strain selected out of French Chevalier.

Longstem is an unusually tall type selected out of common flax, and Novelty, which promises to give a very good yield of seed, is a selection from Novarossick.

Full descriptions of most of these Ottawa varieties and selections have been published in the previous annual reports of the Experimental Farms.

DISTRIBUTION OF SAMPLES OF SEED GRAIN AND POTATOES.

The annual distribution of free samples of seed grain and potatoes has been carried on as usual during the past winter. The grain for distribution was grown chiefly on the Experimental Farms at Indian Head, Sask., Brandon, Man., Ottawa, Ont., and Cap Rouge, Que. Owing to the dry weather at some of these farms the appearance of the grain was not quite so good as usual, but the wheat and peas received from Cap Rouge were very good, the peas in particular being remarkably plump and clean.

All the grain that was not plump and clean enough for distribution was graded and cleaned by various machines; and when any impurities were present which could

not be removed by such treatment, the seed was hand-picked.

It is intended that all grain sent out shall be above criticism. In some cases, however, it is necessary to distribute seed which is not as plump and bright as we could wish, when no other seed of equal purity and of equally good pedigree is obtainable. The appearance of grain is sometimes a very poor guide as to its intrinsic value, and it is better that a farmer should be somewhat disappointed in the appearance of the sample he receives than that he should be seriously disappointed in the purity or vigour of his plot.

The number of samples distributed this year is considerably less than last season; because it was impossible (for various reasons) to accept as many as usual of the applications received late in the season. Although in the announcements of the distribution it is expressly stated that applications received after the end of January will probably be too late, many requests arrive in February and later months.

Farmers who desire to secure samples from this free distribution should apply preferably in November or December, and, to avoid delay, must give a clear statement of their needs, so that a suitable variety may be sent without further correspondence. Applicants for potatoes from other provinces than Ontario and Quebec are supplied

from the branch Experimental Farms.

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The following tables show the number of samples distributed from Ottawa:-

DISTRIBUTION Classified by Varieties.

Name of Variety.	Number of Packages.	Name of Variety.	Number of Packages.
Oats— Banner. Ligowo. Daubeney. Eighty Day. Victory.	1,547 281 276 42 35	Spring Wheat— Marquis. Prelude. Red Fife. Huron. Pioneer. Early Red Fife.	806 382 336 248 121
Barley (six-row)— Manchurian, Success, O. A. C. No. 21	1,192 34 24	Peas— Arthur	1,894
Barley (two-row)— Canadian Thorpe Early Chevalier Gold		Potatoes— Green Mountain. Irish Cobbler.	1,070 238 1,308

DISTRIBUTION Classified by Provinces.

•	Prince Edward Island	Nova Scotia	New Bruns- wick	Quebcc.	Ontario.	Mani- toba	Saskat- chewan.	Alberta	British Colum- bia	Total.
Oats Barley Wheat Peas Potatoes	14 1 9 1 	64 35 68 12	39 24 40 13	548 265 360 113 687 	262 125 173 136 621 1,317	122 117 142 48	683 365 560 238	376 293 454 183	73 61 88 78 300	2,181 1,286 1,894 822 1,308 7,491

SALE OF SEED GRAIN.

The Dominion Cerealist will be glad to furnish information as far as possible, to intending purchasers of seed grain, as to the nearest source of supply for good seed. Seedsmen and farmers in any part of Canada having seed grain for sale are advised to send their names, with a statement as to quantities, etc., and samples of the seed offered, to the Dominion Cerealist.

Most of the branch Experimental Farms have seed grain for sale, usually in limited quantity. There is also, frequently, a small surplus of seed at Ottawa after the free distribution has been finished, which is available for sale, usually in two-bushel lots.

OTTAWA.

VITALITY Tests of Seed Grain grown in 1914 at the Central Experimental Farm and at the Branch Experimental Farms.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

* *** *** *** *** *** *** *** *** ***				=======================================
Kind of Seed.	Numbe of Tests.	Highest Percent- age.	Lowest Percentage.	Average Vitality.
Spring Wheat, Emmer and Spelt. Oats	162 20 70 2 42 7	100 100 100 86 100 \$6 91	57 63 37 77 62 44 26	86 80 84 81 95 76 54
AGASSIZ, B.C.				
Barley	14 15	100	95 95	98
BRANDON, MAI	N.			
Spring Wheat. Barley Oats. Peas. Flax	20 21 18 9 7	100 99 100 99 100 90	86 75 72 84 53	. 91 . 93 . 90 . 91 . 92
- CAP ROUGE, QUI	E.		-	
Spring Wheat Barley Oats Peas	1 '1 1 1			85 96 88 88
CHARLOTTETOWN, H	.E.I.			
Spring Wheat	11 20 13 4	93 99 100 90	83 90 88 80	90 97 95 82
FORT VERMILION, ALK	BERTA.		-	
Spring Wheat. Barley Oats Peas Buckwheat.	8 5 5 1	100 100 99	97 £9 88	99 99 93 98 95
GROUARD, ALBER	ΓA.			
Spring WheatBarley Oats.	2 1 2	99	60	79 98 90
			Отта	WA.

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VITALITY Tests of Seed Grain, etc.—Concluded.

INDIAN HEAD, SASK.

Kind of Seed.	Number of Tests.	Highest Percent- age.	Lowest Percent- age.	Average Vitality.
Spring Wheat Barley Oats Rye Peas	28 21 17 1 10 11	100 100 100 100	90 90 76 78 72	96 96 94 78 88 87
NAPPAN, N.S.				
Spring Wheat Barley Oats Buckwheat	2 2 2 2 1	90 94 99	82 92 93	86 98 96 89
ROSŢHERN, SAS	K.			
Spring Wheat. Barley Oats. Peas.		100 100 98 100	94 90 89 82	95 97 92 93
SCOTT, SASK.				
Spring Wheat. Barley. Oats. Rye. Peas. Flax	12 7 8 1 4	100 94 94 96	78 83 74 62	91 88 82 77 74

MILLING AND BAKING TESTS.

In addition to the variety tests of the wheats grown at Ottawa and the branch Farms, a considerable amount of research work has been done in studying milling and baking processes. This includes experiments on blended flour, the effect of age on wheat and flour, the effect of different proportions of yeast, the "fineness" of flour, the amount of fermentation required, milling to different percentages of flour, etc., etc. The details of these experiments will be published in a separate bulletin.

A bread mixer driven by an electric motor has been installed during the year and an electric drying oven for the estimation of moisture in flour has been in use during the past season.

The following figures give an idea of the extent of the tests carried on:-

Milling Tests—	
Named varieties grown at Ottawa, 1914	18
Varieties grown at Branch Experimental Fa	rma 1014
Samples received from farmons	rms, 1914 53
Samples received from farmers	
Storage experiments	
Make I	
Total	123
Baking Tests—	
Named varieties grown at Ottawa, 1914	18
2 dinocted varieties grown at Offawa, 1914	4.0
Wheat samples received from farmers	a contract of the contract of
Samples received in the form of flour	
Commercial flours tosted	
Commercial flours tested	* * * * * * * * * * * * * * * * 34
Storage experiments	15
Total	185
and in studying milling	and haking processes 410
Total number of loaves made	dia banna processes, 410

CENTRAL EXPERIMENTAL FARM, OTTAWA.

The following pages of this section of the report deal with the work in cereals as carried on at Ottawa under the immediate supervision of the Dominion Cerealist.

WEATHER.

The season of 1914 was rather unfavourable for the best results with cereals. The spring and early summer were very dry, there being scarcely any important showers from the end of April until nearly the end of June. This prevented a uniform germination of seed grain, while smaller seeds, such as flax, suffered most severely. Light showers accompanied with intense heat characterized the remainder of June and the larger part of July. Although the harmful effects of the beginning of the season were somewhat alleviated, the extreme heat of July injuriously hastened the ripening of the very early maturing grains before they had attained full development. Cooler weather with light showers prevailed throughout the remainder of July and August. This permitted the medium and late varieties under test to mature a fair yield of grain of good quality. Harvesting was accomplished with ease and rapidity. Although at no time during the summer was the rainfall ample, yet the even distribution of the showers after the middle of June resulted in larger yields of all classes of grain than would have been anticipated from appearances in the early part of the season.

PLOTS OF CEREALS, ETC., AT OTTAWA.

In 1914 there were sown at Ottawa 640 small plots of cross-bred varieties not yet fixed in character, and 402 small plots of new varieties and selections which have been found to propagate true to type and are now being increased for test on a larger scale.

The regular test plots of grain, for the comparison of varieties, are one-sixtieth of an acre each. The number of plots of this size, last season, was as follows: Spring wheat 168, emmer and spelt 28, oats 67, spring rye 2, field peas 42, field beans 6, flax 31, making a total of 344 plots, and representing about 330 varieties and selected strains.

The total number of plots of all sizes was 1,386.

Owing to the shortage of land for the Cercal Division, the regular test plots for varieties of barley had to be omitted.

EXPLANATION OF TABLES.

In the following tables a discrepancy may be observed in some cases between the figure given as the number of days maturing and that which is obtained by counting the days between the date of sowing and the date of ripening. When any varieties have been sown later or earlier than the majority, it has been found necessary to introduce a correction, because, owing to the great difference between spring and mid-summer temperatures, a difference of a few days in sowing does not produce a corresponding difference in time of ripening.

The character of the straw is indicated by marks on a scale of ten points, according to the proportion of the plot standing erect at harvest time. A variety standing quite erect receives a mark of 10, while one completely lodged is marked 0.

As a rule, only named varieties are mentioned in the tables. Most of the varieties under test are new cross-bred sorts produced by the Dominion Cerealist and recorded for the present by means of numbers and letters. As soon as the value of these sorts has been determined, names will be given to such of them as possess sufficient merit to warrant their introduction to the public.

SPRING WHEAT.

One hundred and forty-five varieties and selected strains of spring wheat were tested in the regular one-sixtieth acre trial plots at Ottawa. The wheat was sown from the 5th to the 9th of May, the seed being used at the rate of about one and one-half bushels per acre. Cutting commenced on July 25, Prelude being, as usual, the first variety harvested.

. Considering the very dry character of the season as a whole, the yields of spring wheat were good, reaching as high as 43 bushels per acre in the case of two of the new cross-bred varieties not yet named.

Burgoyne's Fife, a new English variety, was tested last season for the first time. It stands 140th on the list (including the numbered sorts). It ripened 28 days later than Prelude and 6 days later than White Russian. It is therefore to be classed as an extra late variety when sown as a spring wheat.

Those sorts which have a letter or an Ottawa number after the name are new varieties or selections produced by the Dominion Cerealist.

SPRING WHEAT, Test of Varieties.

Number.	Name of Variety	Date of Sowing.	Date of Ripening.	No. of days mat uring/corrected	Average length of straw, in- cluding head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	gı p	eld of ain er re.	Weight per measur- ed bush- el after cleaning
2 3 4 4 5 5 6 6 7 8 9 10 11 12 13 14 15 6 16 7 18 19 20 21 23 24 25 26 21	Yellow Cross Beardless A. Pringle's Chan-plain C. White Russian C. White Russian D. Red Fern C. Red Fern C. Red Fern B. Pioneer, Ottawa 195. Hungarian White B. Yellow Cross Beardless B. Huron, Ottawa 3. Marquis, Ottawa 15. Prelude, Ottawa 15. Prelude, Ottawa 10. White Fife, Ottawa 10. White Fife, Ottawa 11. Onega A. Hungarian White D. Early Russian, Ottawa 40. Red Fife, Ottawa 17. Early Red Fife, Ottawa 18. Bishop, Ottawa 8. Bobs Goose. Kubanka B. Burgoyne's Fife. Iluguenot B. Kubanka A. Huguenot A.	566555566555555555555555555555555555555	July 25 July 25 Aug. 7. July 25 Aug. 14. July 28. Aug. 7. July 27 July 28. Aug. 7.	944 955 1011 1011 988 858 933 944 966 955 80 1000 899 1055 83 91 91 98 108 93 98 93	44 36 40 40 41 38 32 46 38 41 40 40 40 40 40 40 40 40 40 40	5 9 9 7 7 8 100 100 100 100 100 100 100 100 100 1	4 0 0 4 0 0 4 0 0 3 5 5 2 7 5 5 5 5 5 5 7 5 5 5 5 5 7 5 5 5 5	Lb. 2,130 2,010 2,910 1,980 1,980 1,900 1,710 1,680 1,650 1,620 1,620 1,590 1,560 1,580 1,580 1,580 1,580 1,580 1,580 1,580 1,580 1,440 1,410 1,380 1,280 1,050 960 960 9840	33 33 33 30 28 27 27 27 27 27 27 27 26 26 26 25 25 24 23 23 21 17 16 16	1b. 30 00 00 00 30 00 00 00 00 00 00 00 00	Lb. 64·5 63·3 62·4 64·1 63·5 63·1 63·4 63·4 65·4 61·0 62·2 257·3 63·4 63·1 62·5 63·1 62·5 63·5 63·5 63·5 63·5 63·5 63·5 63·5 63

RECOMMENDED VARIETIES OF SPRING WHEAT.

For Ontario and Quebec.—Huron, very productive, early ripening, bearded, giving flour of fair baking strength. Marquis and Early Red Fife, early ripening, beardless, giving flour of very high baking strength. Red Fife and White Fife rather late in ripening, beardless, giving flour of very high strength. The extremely early

ripening variety Prelude will be useful in some northern localities. It is an excellent variety but should not be expected to give a very large yield. It is not adapted for dry districts.

For the Maritime Provinces.—Red Fife and White Fife are very good. If early sorts are required, Huron and Marquis are recommended. White Russian is popular. It gives a large yield, but is of poor quality for bread-making.

For Manitoba and Saskatchewan.—Marquis is the best variety for most districts. Red Fife is excellent for localities where there is no danger of early frosts. For districts where extreme earliness is required and where there is sufficient rainfall to produce a good length of straw, the new variety Prelude is highly recommended. Pioneer, another new and very early ripening sort should be given a trial if the conditions are too dry for Prelude.

For Alberta.—Red Fife is perhaps the best sort for some of the dry areas towards the south, but, wherever there is sufficient rainfall, Marquis should be tried. If carly-maturing varieties with longer straw than Marquis are essential, Huron or Early Red Fife should be tested. Pioneer, a new variety recently introduced by the Dominion Cerealist, ripens earlier than any of the above-mentioned sorts, and has given good results under dry conditions. It is bearded and produces straw which is usually of fair length. It is not adapted to moist districts. For all localities where the tendency is towards the production of excessively long straw and where a very early-ripening wheat is required, Prelude is unquestionably the best variety known.

For British Columbia.—Huron is one of the best varieties. Red Fife and Marquis may not generally give quite such large crops but they are more popular for bread-making. Prelude or Pioneer may be useful in a few localities where extreme earliness is essential.

EMMER AND SPELT.

The plots of emmer and spelt were sown on the 11th and 12th of May, the seed being used at the rate of about one hundred and twenty pounds (or four bushels by measure) to the acre.

Twenty-three varieties were tested, most of them being new cross-bred sorts produced by the Dominion Cerealist. Only the named sorts are here reported upon.

Common Emmer—often incorrectly called "Speltz"—is one of the best varieties. However for most districts, under ordinary conditions of farming, it has not proved as valuable as the more common cereals, and its use is therefore not advised.

EMMER AND SPELT .- Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	ate of Ripening.	ate of Maturing.	verage Length of Straw in- cluding Head.	trength of traw on a Scale of 10 points.	verage Length of Head.	ield of Grain per Acre.	eight per easured Bushel after Cleaning.
Nur		Dat	Dat	Dat	Ave of ch	Stra Stra of	Av	Yie p	We Me
	-				Inches.	-	Inches.	Lb.	- Lb.
1 2 3 4	Red EmmerSmooth SpeltComnion EmmerDouble Emmer.	May 11	Aug. 25	106 106 98 90	48 45 38 36	10 10 6 2	3.5 4.5 2.2 1.5	3000 2940 1770 1320	39.5 32.5 35.5 30.0

OATS.

Sixty-seven varieties of oats were sown in the regular test plots. The dates of sowing were from the 13th to the 15th of May. The seed was used at the rate of about two bushels per acre, except when the oats were unusually large, when about one-fourth or one-half as much seed again was used.

The first variety to be cut was Eighty Day which ripened on July 28 only 75 days from the date of sowing. The excessive drought was particularly unfavourable

to early varieties.

Those sorts which have a letter or an Ottawa number after the name are selected strains produced by the Dominion Cerealist. Thirty new cross-bred sorts, which have not yet been named, are omitted from the table.

OATS.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Average Length of Straw in- cluding Head.	Strength of Straw on a Scale of 10 points.	Average Length of Head.	Yield of Grain Per Acre.	Yield of Grain Per Acre.	Weight per Measured Bushel after Cleaning.
					Inches.		Inches.	Lb.	Bush. Ib	Lb.
20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35	Victory Danish Island Quebec B Irish Victor Pioneer Early Blonde Quebec A Sib rian Ligowo Swedish Twentieth Century. Banner M Banner, Ottawa 49. American Beauty B Banner I Banner I Banner I Banner K Garton's No. 22. Swedish Black Tartar King. Abundance D O. A.C. No. 72 Quebec C Alpine Swedish Select Gold Rain Excelsior Daube ney, Ottawa 47. Green Mountain Abundance (Garton's Regen) Eighty Day, Ottawa 42. Abundance A. Black Mesdag Bergs Bergs Early Ripe E	13	17	91 95 88 95 95 88 99 91 95 88 95 91 95 95 98 88 88 86 77 91 104 95 88 86 97 91 104 91 104 91 91 91 91 91 91 91 91 91 91 91 91 91	38 40 33 44 40 33 34 40 38 38 38 36 40 38 38 38 38 38 38 38 38 38 38 38 38 38	10 10 10 10 10 10 7 10 10 10 10 10 10 10 10 10 10 10 10 10	Trobes. 7:0 7:0 6:0 7:0 7:0 6:0 7:0 6:5 7:1 7:0 6:5 7:5 6:0 7:5 6:0 7:0 8:0	2580 2490 2220 2160 2130 2130 2130 2070 2040 2040 2040 1980 1950 1860 1860 1740 1710 1680 1680 1680 1550 1550 1570 1470 1440 1380	Bush Ib	Lb. 37 · 7 36 · 1 35 · 0 34 · 7 35 · 6 33 · 9 38 · 9 38 · 9 38 · 1 38 · 9 38 · 1 38 · 9 38 · 1
36 37	Early Ripe F Early Ripe G	114	11 29	76	33	10	4.0	1260	37 2	26.6
01	Lianty Tupo G	11 14	11 29	76	33	10	4.0	1200	35 10	28.2

RECOMMENDED VARIETIES OF OATS.

Among the most productive varieties of white oats, Banner is especially recommended. Ligowo is somewhat earlier in ripening, but does not generally give quite so large a yield as Banner. Gold Rain is a very productive yellow oat. Black oats are not recommended, but Pioneer and Excelsior may be mentioned as two of the best corts.

Farmers who require an extremely carly-ripening variety should try Eighty Day, Orloff, or Sixty Day. The name Sixty Day is misleading, as this out is not earlier than the other two. Daubenoy is another similar sort, almost as early as Eighty Day, but producing somewhat longer straw and slightly larger kernels. All these oute are, however, small.

BARLEY.

Owing to shortage of land, the regular variety tests of barley could not be made this season.

RECOMMENDED VARIETIES OF SIX-ROW BARLEY.

Among the most productive six-row barleys are Manchurian and Odessa. Mauchurian is a selection from Mensury. O.A.C. No. 21 is also a very good selection, similar in character to Manchurian.

The beardless (or "hooded") types of barley at present available in commerce are not very satisfactory. Success and Champion are two of the best kinds. They are both early in ripening; but their straw is not very strong, and they generally give rather a small yield.

The common sorts of hulless barley are Hulless White (beardless) and Hulless Black (bearded). These are characterized by weak straw.

RECOMMENDED VARIETIES OF TWO-ROW BARLEY.

Among the best varieties of two-row barley may be mentioned Duckbill, Goldthorpe, Canadian Thorpe, and some of the strains of Chevalier, especially Early Chevalier if an early ripening sort is desired.

No satisfactory varieties of beardless or hulless two-row barley are yet available. The Dominion Cerealist is experimenting with a number of new cross-bred sorts of his own production.

SPRING RYE.

Two strains of spring rye were sown on the 19th of May, the seed being used at the rate of about one and one-half bushels per acre.

Spring Rye.—Test of Varieties.

Name of V	ariety.	Date of Ripen ing.	Number of day. Maturing.	Average length of Straw, in- cluding Head.	Strength of Straw on a scale of 10 points	Average length of Head.	Yield of Grain per Acre.	Yield of Grain , per Acre.	Weight per measured bushel
1 Select, Ottawa 2 Common		ug. 19	92 92	Juches. 48 50	8 8	Inches. 3.5 3.5	Lb. 2,010 1,860	Bu. Lb. 35 50 33 12	Lb. 56·0 57·2

FIELD PEAS.

Forty-one plots of field peas were sown on the 12th and 13th of May. The seed was used at the rate of about two bushels per acre in the case of small peas and three bushels when the peas were large. The extremely dry weather caused considerable irregularity in the yields. Arthur, Ottawa 18, which is one of the best sorts, did not give good returns this year, as the plot was in an unfortunate position.

Only the named varieties are mentioned in the table. Twenty-seven numbered sorts are omitted.

PEAS.—Test of Varieties.

Number	Name of Variety.	Size of Pea.	Date of Ripen- ing.	Number of days.	Average length of Straw.	Average length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight permea- sured bushel after cleaning
2 3 4 5 6 7 8 9 10 11 12 13	Picton. Paragon. Prince. Solo. White Marrowfat. English Grey. Golden Vine. Wisconsin Blue. Daniel O'Rourke. Black eye Marrowfat. Arthur, Ottawa 18	Medium Large	Aug. 25 19 19 24 124 19 27 29 20 20 26 26 26 10 26 11 26 11 26 11 21 10	105 99 104 106 104 99 107 106 106 106 106 106 92 90	Inches. 62 50 50 50 50 55 75 58 63 65 60 48 48 50	Inches. 2 5 2 2 2 2 2 5 2 0 2 5 2 0 2 5 2 0 2 2 2 2 2 0 2 2 2 0 2 2 2 0	Lb. 2,910 2,730 2,580 2,550 2,550 2,220 1,920 1,890 1,890 1,740 1,650 1,410 1,050	Bush. 1b. 48 30 45 30 45 30 42 30 42 30 42 30 37 00 32 00 31 30 31 30 30 00 29 00 27 30 23 30 17 30	Lb. 64 4 66 0 64 5 64 3 65 0 63 9 65 3 65 0 65 0 65 0 65 0 65 0 65 0 65 0

RECOMMENDED VARIETIES OF FIELD PEAS.

Among the best sorts which are available to the public may be mentioned Prussian Blue, Arthur and Golden Vine. Golden Vine is a small, yellow pea. Arthur is yellow, of medium size, and earlier in ripening than most other sorts.

FIELD BEANS.

Five plots, one-sixtieth of an acre each, were sown with field beans on May 26. Very late maturing sorts are not included in these tests. The beans were all sown in rows 16 inches apart.

FIELD BEANS .- Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	Number of days Maturing.	Average length of Plant.	Average length of Pod.	Yield per Acre.	Yield per Acre.	Weight per mea- sured bushel after cleaning.
3	Norwegian Brown, selected	Sept. 1 " 1 " 5 " 5 Aug. 22	98 98 102 102 88	Inches. 15 15 14 12 12	Inches. 4 5 3:7 3:7 4:0 3 0	Lb. 3,660 2,460 1,950 1,710 1,650	Bush. 1b. 51 00 41 00 32 30 28 30 27 30	Lb. 6114 6117 6515 6412 5815

FLAX.

Thirty-one selected strains of flax were grown in the regular test plots. The seed was sown from the 13th to the 15th of May at the rate of about 60 pounds per acre. Owing to the severe drought in spring and early summer, the germination of the flax was very irregular and the growth unsatisfactory. The crop was quite small in most cases.

All the strains under test were selected at Ottawa.

FLAX-Test of Varieties.

Number.	Name of Variety.	Name of Variety. of Sowing. Ripening. days maturing. length of Plants			Yield of seed per acre.	Yield of seed per acre.		Weight per measured bush. after cleaning.	
1 2 3	Novelty, Ottawa 53 White, E 1A. White, E 3. Foremost B. White E 1 B. White E 1 B. White D 3 White E 2. Common A. " D. White Flowering A. Riga C. Russian A. White A. Common C. Foremost C. White Flowering B. Yellow Seed A. Common B. Riga B. Foremost A. Russian B. White D 1. La Plata B. " C. White C. Yellow Seed B. White B. Yellow Seed C. La Plata A.	11 14 11 14 11 13 11 14 11 14 11 13 11 14 11 14 11 14 11 15 11 15 11 15 11 16	Aug. 26 Sept. 1 Aug. 26 Sept. 1 Aug. 26 Sept. 1 Aug. 26 Sept. 1 Sept. 1 Sept. 1 Sept. 1 Sept. 1 Sept. 3 Sept. 3 Sept. 4 Sept. 4 Sept. 4 Sept. 4 Sept. 5 Sept. 5 Sept. 5 Sept. 6 Sept. 6 Sept. 6 Sept. 6 Sept. 6 Sept. 7 Sept. 7 Sept. 7 Sept. 7 Sept. 8 Sept. 8 Sept. 8 Sept. 9 Sept.	110 104 110 110 110 110 110 110 103 110 104 104 104 103 110 110 110 110 110 110 110 110 110	Inches. 24 20 23 26 18 18 18 28 26 24 26 24 26 28 28 24 24 27 28 28 38 30 30 18 18 18 18 20 27 20 27	Lb. 900 840 780 750 750 690 690 630 630 630 600 570 570 570 570 570 570 540 510 510 510 480 480 480 480 420	Bush. 16 15 13 13 13 12 12 12 11 11 11 10 10 10 10 10 10 10 10 10 10	1b. 4 5222218 188144010 10010036666666323232232228854	53.0 53.3 53.6 54.2 52.52 55.1 54.2 55.1 54.0 55.4 55.8 55.1 54.0 55.4 55.1 54.0 55.4 55.1 54.0 55.4 55.1 55.2 55.1 54.2 55.1 54.2 55.2 55.1 56.2 56.2 56.2 56.2 56.2 56.2 56.2 56.2

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

J. A. CLARK, B.S.A., SUPERINTENDENT.

SEASONAL NOTES.

The ground had been well covered with snow during the winter of 1913-14. March was mild but during April and the first half of May the weather was cold and vegetation very backward. Seeding commenced May 18, but was greatly delayed by frequent showers, cold nights and the absence of any really hot days. July and August were favourable months. All grain was late ripening, Daubeney oats being the first cut August 20. The first and third weeks of September were unusually hot, the thermometer rising several degrees higher than any previous day during the summer, insuring the quality of the greatest harvest of many years in this province.

CEREAL AREA.

The land available for the cereal division lies between the Mount Edward road on the east, the Prince Edward Island railway on the west, the St. Avards road on the north and the boundary of the Station property on the south. A three-year rotation was started on this area in 1913. Certain areas, however, were found to be unsuitable for variety tests and will be used for multiplying plots and decoying birds away from the test areas. In order to test in duplicate the desirable varieties of cereals on this land it became necessary to adopt a rotation that would produce more grain than the one mentioned in 1913. The following four year rotation has been devised to meet necessary conditions:-

First year.—Hoed crop. Manured 12 tons per acre.

Second year.—Wheat and barley plots, seeded down with 10 pounds of red clover, 2 pounds of alsike and 5 pounds timothy.

Third year.-Clover hay, manured 8 tons per acre, after hay is removed, and ploughed under.

Fourth near.—Oat plots, seeded down with 8 pounds red clover and 2 pounds of alsike.

UNIFORM TEST PLOTS OF CEREALS.

The season was most favourable for cereals, and the crops in general quite equalled the banner year of 1910. The uniform tests were sown in duplicate in one-sixtieth acre plots as follows:-

Spring wheat, May 20; oats, May 22; barley, May 30.

Scarcely any stinking smut was observed. All heads of loose smut were hand picked as soon as they appeared. This has greatly decreased the percentage of this troublesome disease.

Rogueing was continued throughout the season.

The seed was obtained from hand-selected heads taken from the 1913 plots except the following new strains that were received from the Cerealist at Ottawa: Banner, Ottawa 49 oats, Marquis, Ottawa 15 wheat, and Early Chevalier, Ottawa 51 barley, and one lot received from the Ontario Agricultural College, known as O. A. C. No. 72 outs. The paths and roads were all seeded with grass and clover the same as the plots. The hay from the paths was removed early in August.

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EXPERIMENTS WITH SPRING WHEAT.

All plots made strong growth. Green aphis was very numerous for a time on the heads of wheat. Parasites, however, apparently destroyed the aphis and prevented any serious injury.

Spring Wheat.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw includ- ding Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per acre.	Yield of Grain per acre.	Weight of Measur- ed Bush- el after Clean- ing.
_					Inches.		Inches.	Lb.	Bush. Lb.	Lb.
2 3 4 50 6 7 8	Chelsea. Early Red Fife. Huron. Stanley Marquis. Red Fife. 378 A. White Fife. White Russian. 86 D 2.	n 20	" 7. " 7. " 7. " 7. " 5.	104 105 107 109 104 109 104 107 107	47 50 50 48 40 47 46 46 44 41	9.5 10.0 10.0 10.0 9.5 10.0 9.0 10.0 10.0 9.5	3·7 3·2 3·0 3·5 2·7 2·7 3·5 3·0 3·5 2·7	3,193 3,099 2,550 2,159 1,981 1,838 1,849 1,416 1,410 1,166	53· 13 51 39 42 30 35 39 33 1 30 38 30 49 23 36 23 30 19 26	63·8 63·7 64·3 62·0 64·0 63·0 62·6 62·8 62·0 62·7

Plot B Marquis was very much affected by couch, about one-half being almost totally killed out.

EXPERIMENTS WITH OATS

The seed was treated with formalin at the rate of one pint of formalin to forty gallons of water. More than one-half of the area sown with oat plots was badly infested with couch grass that greatly lessened the yields. A dead furrow happened to run the full length of the duplicate plots of Banner oats, destroying the value of the test. The injury could not be estimated and the actual yields are recorded.

OATS .- Test of Varieties.

-											
Nuniber.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw includ- ing Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per acre.	Yield of Grain per acre.	Weight of Measur- ed Bush- el after Clean- ing.	
					Inch s.		Inches.	Lb.	Bush. Lb.	· Lb.	
3 4 5 6 7 8 9 10 11 12 13 14	Victory O. A. C. No. 72. Lincoln. Gold Rain. Ligowo. Old Island Black. Pioneer. Norway. Early Blossom. Swedish Select. Daubeney. Siberian Banner. A bundance. Twentieth Century.	1 22 22 1 22 22 1 22	Sept. 5 " 4 " 3 Aug. 28 " 28 Sept. 1 " 2 Aug. 20 Sept. 2 Aug. 20 Sept. 2 Aug. 31 Sept. 2	106 105 104 105 104 98* 98* 102 103 103 90 103 103 103	54 60 50 51 52 51 36 48 45 46 41 48 42 47 43	6·0 6·0 3·5 4·0 1·5 5·0 9·5 6·0 8·5 2 7·5 9·5 10·0 9·0 9·0	7·7 9·0 8·5 8·0 8·2 9·0 7·0 7·0 7·0 7·0 7·0 7·0 7·0	4,072 4,039 3,987 3,912 3,855 2,476 1,809 2,424 2,804 1,930 1,752 1,725 1,685	119 26 118 27 117 9 115 2 113 13 74 18 72 28 71 10 67 26 61 7 56 -26 53 7 51 18 50 25 49 19	39·4 36·1 37·5 40·8 39·0 35·6 36·8 34·0 40·1 30·6 38·1 30·4 39·4	

Plots of Siberian, Swedish Select, Twentieth Century, Pioneer and Old Island Black, badly injured by couch; both plots of Banner injured by couch, and they had a dead furrow throughout the whole length of each plot.

EXPERIMENTS WITH BARLEY.

The plots of barley were on land much more uniform than the other cereals and the test is relatively more valuable. The Old Island two-row (English Chevalier), favourably mentioned last year, again deserves special mention as the character of dropping its awns in the field is becoming more fixed.

The plots of barley were sown on the 30th of May.

BARLEY-Test of Varieties.

Name Name	of Variety.	Six- row or two- row.	Date of Ripen- ing.	Number of days maturing.	Average length of straw including head.	Strength of straw on a scale of 10 points.	Average length or head.	Yield of grain per acre.	Yield of grain per acre.	Weight of measured bushel after cleaning.
1 Island T 2 Gold	en. Chevalier No. 21 In Thorpe rian ch, ole. hevalier	6 2 2 6 6 6 2 6 6 2 2 2 2 2 2 2	Sept. 7 " 7 " 1 " 6 " 7 " 1 " 6 " 7 " 1 " 1 " 1 " 1 " 2 " 2 " 2 " Sept. 1	100 100 95 94 99 100 94 94 94 100 94 94 94 96 86	Inches. 37 35 45 45 45 39 39 43 43 43 42 44 40 42 45 40 48 54	8 0 8 0 9 5 9 5 5 0 0 6 0 7 5 9 2 9 5 9 5 9 5 9 5 9 5 9 5 9 5 9 5 9 5 9 5	Inches. 3 : 5 3 : 5 3 : 0 3 :	Lb. 3,999 3,953 3,899 3,808 3,757 3,557 3,420 3,404 3,373 3,369 3,328 3,328 3,137 3,129 3,119 3,097 3,588	Bush. lb. 83 15 82 17 81 11 79 16 78 13 74 5 71 20 70 44 70 13 70 9 69 16 69 14 65 18 65 17 65 9 64 47 64 25 52 42	Lb. 55.1 55.4 51.0 51.3 54.2 53.0 48.6 48.9 49.8 53.4 51.0 51.3 55.0 53.6 53.4 64.5 62.0

EXPERIMENTS WITH PEAS.

The cold backward season was against the early ripening of the peas. A very large green aphis attacked the peas in great numbers in August. We immediately sprayed them with kerosene emulsion which killed most of the insects and checked the attack so that no further damage was done. A considerable amount of injury was done by the pea weevil.

PEAS-Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Sowing.	Date of Ripen- ing.	Number of days Maturing.	Average Length of Straw.	A verage Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measurcd bushel after Cleaning.
2		Medium Large Small		Oct. 3 Sept. 15	108	Inches. 105 60 90	Inches. 2.7 2.2 2.0	Lb. 1,797 1,564 1,222	Bush. lb. 29 57 26 4 20 22	Lb. 62 5 65 0 65 1

CHARLOTTETOWN.

FIELD PLOTS OF CEREALS.

The demand for registered seed from this Station is now much greater than can be supplied owing to the limited area of land for this purpose. These multiplying plots are grown on the regular farm rotations which, though much more uniform than they have been in the past, still vary greatly in soil and fertility as shown by the two fields of Banner oats sown with the same seed. The grain was saved in excellent condition and gave a very high germination test, several varieties giving 100 per cent strong germination.

These plots were carefully rogued twice during the season.

MULTIPLYING PLOTS OF CEREALS.

SPRING WHEAT.

Variety.	Field.	Preceding crop.	Acreage.	Yield p	er acre.
Marquis. Marquis. Red Fife	B-5 F-4 D-3	Turnips Turnips Potatoes Average	1·0 0·86 1·0	Bush. 28 18 14 20	Lb. 25 47 12 28
	OATS.				
Banner. Banner. Banner. Ligowo. O d Island Black. D aubeney. Victory.	$\begin{array}{c} A-5 \\ B-2 \\ \text{Connolly field.} \\ G-1 \\ C-4 \\ G-6 \\ \text{Haszard field.} \end{array}$	MangelsClover hay. OatsCornCornHayPasture	1 0 1 0 8 0 0 4 0 57 0 4 3 0	83 50 35 66 63 47 35	27 10 9 8 33 19 32
		Average		54	24
	BARLEY	,			
Gold	F-2 A-3	HayHay.	0 86 1·0	57 50	13 2
		Average		53	31

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CO-OPERATIVE TEST OF THREE VARIETIES OF OATS.

The co-operative test of oats begun in 1912 was continued. The same three varieties were tested in duplicate plots of one-sixtieth acre each on two of the original farms and one new one, which are mentioned below. Mr. Garnet LeLacheur, Seed Inspector, and Mr. Wilfred Davison, Provincial Field Husbandman, furnished the field notes and took supervision of the field work. The grain was forwarded to the Experimental Station where it was threshed, graded and weighed.

Co-operative test of plots of oats:—Test of Banner, Ligowo and Old Island Black Oats in Queens and Kings counties. The average of duplicate plots is here given.

Name of Experimenter.	Location.	Yield per zore.						
Ivado di Paporinonosi	230000000	Banner.		Ligowo.		O. I. Black.		
Mr. A. M. Stewart	Belle River	Bush.	lb.	Bush.	lb.	Bush.	lb.	
Mr. E. G. Geddings. Mr. Ottis McLeod.	Abney		13	61 48	26 26	63 45	26	
Average yield per acre, 1914		70	28	56	20	58	11	
Grand average yield per acre, 1912-14, from 26 plots of each variety on eight farms		62	21	52	24	55	12	

From the above data we see that Banner has increased its lead over Ligowo to 9 bushels and 31 pounds, and over O. I. Black to 7 bushels and 9 pounds, the season being somewhat against such weak strawed varieties as the Old Island Black.

I wish again to thank the men mentioned above for the very careful and painstaking assistance which they have given in connection with this series of experiments.

EXPERIMENTAL FARM, NAPPAN, N. S.

W. W. BAIRD, B.S.A., SUPERINTENDENT.

SEASONAL NOTES.

Cerealists cannot be other than pleased with the effect of the 1914-15 season on cereal crops in general. Although the spring growing period was somewhat unfavorable owing to the cold and damp weather, nevertheless the various grains made good growth when they once got started. The summer season was fairly dry and allowed the grain to ripen in good condition and the weather during the harvesting period could not have been more auspicious.

Seeding was done during the few very fine days of the latter part of May. These weather conditions were so favourable at this time that germination took place much more rapidly than last year. The grain was only seven days in showing above the ground, whereas last year it was from eighteen to twenty days. All the grain was some fifteen days later in being sown this year, but was more advanced the first week in June than it was the previous season, due to favourable weather conditions prevailing at that time.

The first part of June was very cold and frequent precipitations were recorded. The weather became more favourable towards the latter part, however. July and August were good growing months with only occasional precipitations and cool weather. September opened with cool, wet weather, but several exceptionally fine days occurred during the middle of the month and presented ideal conditions for harvesting. All grains were stored in excellent condition and very satisfactory yields were recorded.

Up to the 16th of October weather conditions were most favourable for harvesting, but a cold, wet spell was experienced after that date, which caused some delay. Quite heavy frosts were recorded during the early part of the month. Only fair progress could be made in fall ploughing, as much of the land was too wet. The total precipitation was 2·46 inches. Cold, wet weather prevailed throughout the first three weeks in November. The remaining part was very fine and mild, enabling all roots to be harvested in fair condition. The total precipitation was 2·97 inches. The weather was rather unsettled during December. The first two weeks were fairly fine with occasional snow flurries. Fairly heavy showers with low temperatures characterized the latter part. It may be said that it was a very open fall with considerable rainfall, followed by a very open winter with much mild weather during the latter part.

Smut was much in evidence, more especially in the oats. All grain was very free from noxious weeds and very little lodging was noted excepting in Daubeney oats which gave evidence of being weak in the straw.

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Some Weather Observations taken at Nappan Experimental Farm, 1914.

Month.	Ткы	PERATURE	F.	P	Total Sunshine.			
	Highest. Lowest. Mean		Mean.	Rainfall.	Snowfall.	Total.	, and the second	
1914. January. February. March. April May. June July. August. September. October November December	42 46 61 79 77 84 84 84 69 60	- 19 - 27 8 8 24 26 35 40 33 20 7 - 17	13:5 7:5 30:17 33:94 49:03 54:19 61:54 62:84 56:25 27:02 33:59 20:22	Inches. 1 '30	Inches 17.00 - 23.00 - 4.00 - 18.00	Inches. 3:00 2:60 2:13 3:69 -75 4:23 3:61 2:95 3:05 2:46 2:97 1:46	Hours. 92 · 40 138 · 50 107 · 85 172 · 05 147 · 10 243 · 30 255 · 00 210 · 80 161 · 75 139 · 35 85 · 75 110 · 15	
Total for year Average for five years . Total for six growing mode. Average of five years for	nths Anril	to Septem	ber	26.70 30.83 16.48 17.56	62:00 56:74 18:00 6:3	32·90 36·71 18·28 18·19	1,864·20 2,003·04 1,190·20 1,298·65	

Uniform test plots of wheat, oats and barley were sown in duplicate on May 21 and 22 on land which was medium heavy clay loam with a sandy subsoil. The preceding crop had been roots, on which manure was applied at the rate of twenty tons per acre. The land was fall ploughed and thoroughly cultivated in the spring to insure as friable a seed bed as possible.

EXPERIMENTS WITH SPRING WHEAT

Eleven varieties of wheat were grown in uniform test plots of one-sixtieth of an acre each.

Seed was sown at the rate of one bushel three pecks per acre. Although sown some fifteen days later than last year, germination took place much more rapidly, due to favourable weather and the good condition of the soil. Particularly favourable weather was experienced during July and August, and harvesting was done in excellent condition.

The following were the average yields obtained. Varieties not yet named are emitted from the table.

WHEAT	.—Test	of Va	rieties
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Name of Variety.	Date	Date of ing.	Number	Average ler	Strength Straw or soale of points.	Average length of Head,	Yield of G per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
White Russian Ma 2 White Fife 3 Marquis 4 Bishop 5 Early Red Fife 6 Huron 7 Red Fife 8 Stanley	y 21 21 21 21 21 21 21	Sept. 16 16 14 12 14 12 14 12 14 12 14 14 14	117 117 115 113 115 113 115 115	53.5 58.7 51.0 52.0 53.0 46.0 49.0 48.5	8 9 10 9 10 10 10	Inches. 3 5 3 7 3 0 3 0 3 0 3 0 3 0 3 0	Lb. 2,700 2,655 2,535 2,5347 2,347 2,182 2,130 1,852	Bush. lb. 45	Lb. 59.0 59.0 60.0 60.0 60.2 59.0 59.0

The average yield of all the plots of wheat was 37 bushels 48.6 pounds per acre.

EXPERIMENTS WITH BARLEY.

Experiments were conducted with barley in duplicate with twelve varieties, six of six-rowed and six of two-rowed, in test plots one-sixtieth of an acre in size. The grain was sown at the rate of two bushels per acre, and very satisfactory growth was made during the season.

The following were the results obtained:-

BARLEY-Six-Row-Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average length of Straw in- cluding Head.	Strength of Straw on a scale of 10 points	Average length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per mea- sured bushel after cleaning.
2345	Nugent Manchurian O.A.C. No. 21 Stella. Odessa. Oderbruch	May 22. 10 22. 11 22. 12 22. 12 22. 13 22. 14 22.	Sept. 5 5 7 Aug. 31	105 105 103 107 100 100	Inches. 44.5 45.0 46.7 46.5 42.3 43.3	10 10 10 5 10	Inches. 2.5 3.0 2.7 2.5 2.3 2.3	Lb. 2,700 2,595 2,220 2,205 1,770 1,590	54 3 46 12 45 45 36 42	Lb. 48·2 47·7 44·0 48·5 48·5 48·2

The average yield of all the plots of six-row barley was 45 bushels 20 pounds per acre.

NAPPAN.

BARLEY-Two-Row-Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripen- ing.	Number of Days Matur- ing.	Average Length of Straw includ- ing head.	Strength of straw on a scale of 10 points.	Average Length of head.	Yield of Grain per Acre.	Yield Gra per A	in	Weight per measured bushel after cleaning.
2 3 4 5	Swedish Chevalier French Chevalier 'Fold Canadian Thorpe Invincible Beaver	May 22 11 22 11 22 11 22 11 22 11 22	11 7 11 7	105 103 105 107 107 105	Inches. 41.3 40.3 38.5 46.5 53.0 46.0	5 9 8 9 10	Inches. 3.3 3.3 2.5 2.5 3.0 3.0	Lb. 3,150 2,790 2,790 2,550 2,340 1,440	58 58 53	1b. 30 6 6 36	50.0 50.5 53.5 47.5 50.0 49.7

The average yield of all the plots of two-row barley was 52 bushels 14 pounds per acre.

OATS.

Twelve varieties of oats were tested in duplicate test plots one-sixtieth of an acre in size, the seed being sown at the rate of three bushels per acre. A very strong stand was obtained in the majority of cases, and the only varieties to be affected with lodging were Daubeney and Lincoln. Smut and rust were considerably in evidence, particularly the former, which no doubt appreciably affected the yield.

The following were the results obtained:-

OATS-Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripen, ing.	Number of days maturing.	Average Length of Straw including Lead.	Strength of Straw on a scale of 10 points.	Average length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
23 4 5 6 7 8 9 10	Victory	11 21 11 21 11 21 11 21 11 21 11 21 11 21	Sept. 12 " 8 " 8 " 7 " 10 " 10 Ang. 27 Sept. 10 " 10 " 7	113 109 109 103 111 111 111 97 111 111 106 108	Inches. 55.0 56.5 55.0 55.0 58.0 58.0 56.0 56.0 56.5 56.5 56.0 55.5	8 10 8 10 9 10 10 7 8 9 9	7:0 7:5 7:0 7:0 7:0 8:0 8:0 8:0 6:5 7:5 7:0	Lb. 3,390 3,180 3,135 3,090 3,045 3,000 2,955 2,910 2,885 2,820 2,805	Bush. 1b. 99 24 93 18 92 7 90 30 89 19 88 8 66 31 85 20 84 29 84 9 82 32 82 17	Lb. 40·0 38·0 37·5 38·0 35·0 38·0 35·0 34·0 37·0 38·5 39·0 37·0

The average yield of all the plots of oats was was 88 bushels 14.6 pounds per acre.

BUCKWHEAT.

Five varieties of Buckwheat were sown in uniform test plots of one-fortieth of an acre in size, lack of suitable soil preventing this work being duplicated. The soil was a clay loam and had been summer-fallowed the previous season and was only in a fair state of fertility. Barnyard manure was applied at the rate of twenty tons per acre and a thorough cultivation was given. The yield was somewhat reduced owing to the plots being grown between two rows of large apple trees.

The following were the results:-

BUCKWHEAT-Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripen- ing.	Number of days Maturing.	Average Length of Straw, including head.	Strength of Straw on a scale of 10 points.	Yield of Grain per acre.	Yield of Grain per acre.	Weight per measured bushed after cleaning.
2 3 4	Silverhull (frey Japanese Rye. Tartarian	June 12 11 12 11 12 11 12	11 7	87 87 87 87 87 87	Inches. 32 31 33 34 33	9 10 10 10 10	Lb. 1,000 1,800 1,320 1.810 1,600	Bush. lb. 27 40 37 24 27 24 , 38 16 33 16	Lb. 49.5 47.0 48.0 50.0 49.0

The average yield of all the plots was 31 bushels 24 pounds per acre.

Note.—Silverhull was badly picked by birds, which explains its low yield. Estimated loss, 40 per cent.

PEAS.

Ten varieties of peas were sown in duplicate plots one-sixtieth of an acre in size on May 30. The soil was a medium clay loam, and received the same cultivation and treatment as that for the field lots of grain. Unfortunately these peas were so badly infected with blight that no crops could be harvested.

FIELD CROPS OF SEED GRAIN.

Some twelve acres were sown of wheat, oats and barley in field plots one and two acres in size.

The soil was a clay loam varying from medium to heavy. Three acres of wheat were sown on soil which had produced roots the previous season and had been manured at the rate of twenty tons per acre. It was ploughed in the fall of 1913 and given a thorough cultivation in the spring of 1914 to ensure as perfect a seed bed as possible.

The soil on which the oats were grown had produced a crop of roots in 1911, when it received barnyard manure at the rate of twenty-five tons per acre. In 1912 it produced a crop of grain and in 1913 a crop of clover hay was harvested. The aftermath of this crop was ploughed under and the field produced another crop of grain this year. No certilizer or manure had been applied to this field since 1911, with the exception of the clover which had been ploughed under.

The barley was sown on land which had produced a crop of roots the previous year and had been manured at the rate of 25 tons per acre. This field was not ploughed in the fall of 1913 on account of being too wet, but was ploughed in the spring of 1914 and received a very thorough cultivation.

NAPPAN

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Seed produced by these field lots of grain was cleaned and hand-picked during the winter and is now for sale in small quantities.

The following table gives the yields which were realized:—

	Date of Seeding.	Date of Ripening.	Total Yield.	Yield per acre.
Wheat— †acres Red Fife 1½ acres Huron.,	May 22	Sept. 21	Bush. 1b.	Bush. lb. 35 5 27 40
Oats— 3 acres Ligowo. 2 acres Abundance 2 acres Banner	May 22 11 23 11 23	Sept. 10 13 13	158 20 137 22 142	52 29 68 28 71 00
Barley— 1 acre Manchurian	June 3	Sept. 17	53 17 54 28	53 17 54 28

EXPERIMENTAL STATION, KENTVILLE. N.S.

W. S. BLAIR, SUPERINTENDENT.

April was cold and backward. The rainfall during May was light. Cool, cloudy days, however, with no warm drying winds during the first half of May kept the land wet, and, except on very dry places, land was not fit to work until the 16th. From this date to the end of the month the weather was fine and dry for seeding. The first seeding was done on the 20th. The temperature during June was slightly below normal. There was a light frost on June 4, which was much more severe at other points in the valley than at this station, however, no injury to grain was reported. Early-seeded barley showed a slight yellowing evidently due to low temperature but it recovered toward the latter part of June. Precipitation was ample, 4.2 inches of rain having fallen during the month. July was also cool being about 1 degree lower than the average mean. The month was exceedingly dry at this station only 1.45 inches of rain having fallen. There was much more rain in other parts of the province, however, during this period. The sunshine was not as great as usual, and this with the relatively cool weather offset the shortage in rain somewhat so that cereal crops made good growth. August was a favourable month with well distributed showers making a total rainfall of 2.58 inches. The mean temperature was about 1 degree below the average. During the first week of September we had frequent heavy showers which made it difficult to properly dry the grain which was cut at this time. After this, however, the harvest weather for late grain was fine.

The season throughout favoured cereal crops. The growth of straw was good and generally was secured in good condition.

LAND FOR GRAIN PLOTS.

The land for cereal work was in forest growth in 1910, the wood being cut in 1911. The ground was cleared of stumps in the fall of 1912 and early spring of 1913. This land could not be got ready early in 1913, and it was thought desirable to seed to oats with the intention of cutting green for feed. The fall of 1913 however was favourable and the growth good, with the result that the grain ripened fairly well. No fertilizer was put on this land in 1913, but this season a fertilizer composed of nitrate of soda, acid phosphate and muriate of potash containing 4 per cent nitrogen, 8 per cent phosphorus and 5 per cent potash was sown broadcast at the rate of 400 pounds per acre before seeding the plots.

GRAIN PLOTS.

A small start was made in 1913 with selected seed supplied by the Cereal Division, Ottawa. This grain was saved and half an acre each of Red Fife and Marquis wheat, Manchurian and Canadian Thorpe barley, and one acre each of Banner and Daubeney oats were seeded in 1914. The land on which this grain was sown was as stated above. The seed was sown on May 20 with a disc drill and the ground seeded to clover and timothy at the same time. The yield per acre and other data secured from these areas are as follows:—

Variety.	When Cut.	Length of Straw.	Yield per Acre.
Manchurian Barley Canadian Thorpe Barley. Daubeney Oats. Banner Oats. Marquis Wheat. Red Fife Wheat.	24	32 34 40 46 41 42	Bush. lb. 24 12 22 8 52 28 58 9 26 15 23 5

WINTER RYE.

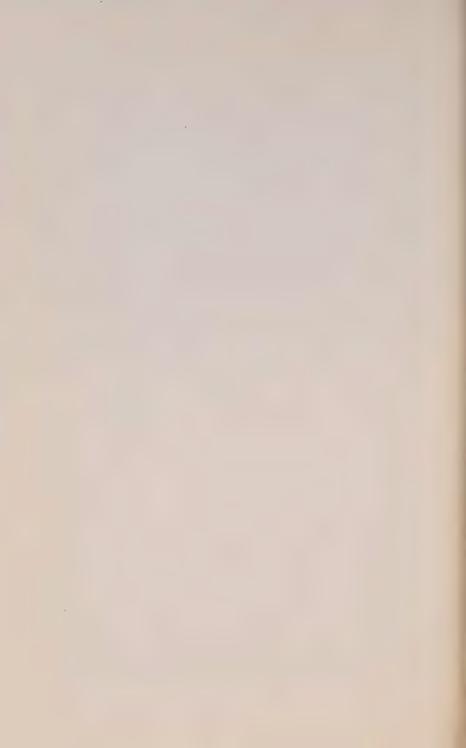
A piece of ground was seeded to winter rye September 12, 1913. The land was in grain in 1913 and was cleared from stumps in 1911 and 1912. Ten tons of manure were spread on the land in the fall of 1913, after which it was pleughed, well worked down and seeded. The crop was harvested August 7, and yielded 23 bushels per acre. The growth of straw was 54 inches.

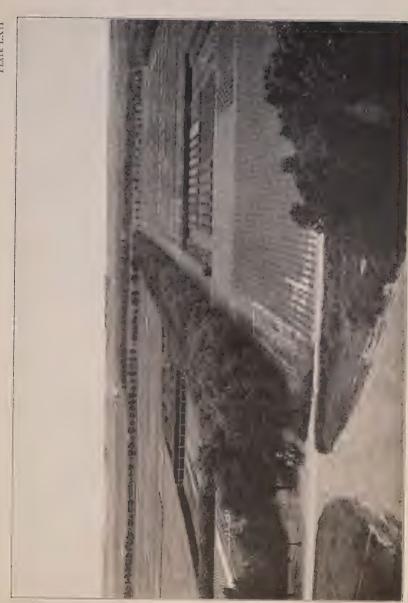


Multiplying plot of Ligowo oats at Charlottetown, P.E.I., 1914.



Cereal plots at Charlottetown, P.E.I., August, 1914.





General view of Experimental Plots, Brandon Experimental Farm.



EXPERIMENTAL STATION, FREDERICTON, NB.

W. W. HUBBARD, SUPERINTENDENT.

From a cereal standpoint the weather for 1914 was in the main fairly good. May was cold and dry, enabling the preparation of a seed bed but germination was slow. June gave sufficient moisture, but no warmth, and grain came up rather yellow and feeble. July was dry but grain did not suffer from drought; there was, however, lack of heat. From August 1, however, weather conditions were ideal and crops came on well and as the good weather continued through September and October harvesting was well done. On the Station land, soil conditions were such as to prevent large yields, but in the Province generally yields of grain were slightly better than for the last five years.

As yet no experimental work with cereals has been undertaken at this Station. The old land on the farm is so full of mustard that no good results can be obtained in grain growing until this troublesome weed has been worked out, and the land that is being cleared and drained is as yet too uneven to permit of work of any record value being done upon it.

Thirty-five acres of newly cleared land were sown in oats from the 23rd to 30th May, the varieties of oats used being Banner, New Market and Early Blossom. The first sowing was of Banner on 4½ acres, seeded at the rate of three bushels per acre. The yield was 220 bushels, at the rate of 48·8 bushels per acre. The next sowing was 4½ acres of New Market on May 27th. The yield was 200 bushels, at the rate of 42·1 bushels per acre. On the 28th, 29th, and 30th May 25¼ acres of newly stumped land was sown with home grown Banner, P. E. Island Banner, New Market and Early Blossom Oats and the yield was 583 bushels, at the rate of 22·6 bushels per acre.

In the latter case a portion of the crop could not be threshed as the stubble was so full of small roots we could not put the rakings through the thresher. This ground was very rough and uneven, and the crop could not be cut with a binder. A self-rake reaper was used and all that could not be lifted clear with a fork could not be threshed, between two and three bushels per acre was thus probably not accounted for.

Buckwheat was sown upon seven and a half acres of newly cleared land, as soon as the land could be got ready, on 27th June, at the rate of one bushel per acre. Two hundred and twenty pounds of 2-5-8 fertilizer were sown with the seed and there were also some ashes from the stump piles spread over the ground. At no time did this crop do well and the yield was only 136 bushels, at the rate of 18-1 bushels per acre. Three varieties of buckwheat were grown, viz.: Rough or Yellow, Silver Hull and larrey Buckwheat. It was not possible, by reason of the roughness of the land, to keep these varieties sufficiently well separated to give reliable yields of each.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIÈRE, QUE.

JOSEPH BEGIN, SUPERINTENDENT.

It has been impossible, thus far, to start a regular series of experimental plots of cereals, but the purchase and preparation of additional land will make it possible to undertake such experiments on a suitable scale in the near future. It is proposed to have a series of test plots of wheat, oats, barley, peas, etc., and also to grow a few of the best varieties in a larger way.

This season seven of the most promising kinds of grain for this district were tested on somewhat irregular pieces of land. The following table gives the results of the tests. All the varieties were sown on June 2, fifteen pounds of seed being used

in each case.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Length	Yield of Grain.
Huron wheat. Marquis wheat. Ligowo oats Daubeney oats. Manchurian barley. Success (beardless) barley Arthur peas	10 11 8 Aug. 26	104 102 100 98 85 79 100	34 33 31 32 28 25 24	3.0 3.0 6.0 6.0 3.2 3.1 2.1	Lb. 232 201 170 145 269 248 276

In order to determine the action and value of Farmogerm (nitrogen gathering bacteria), one-half of the plot of Arthur peas was sown with seed which had been treated with this substance. The other half was sown with untreated seed. Unfortunately no definite conclusions can be drawn from the experiment, as the lower portion of the plot where the treated seed was sown was on a steep slope and was considerably damaged by water. There appeared, however, to be some advantage from the treatment of the seed.

EXPERIMENTAL STATION FOR CENTRAL QUEBEC.

GUS. LANGELIER, SUPERINTENDENT.

WORK WHICH IS OF INTEREST TO GRAIN GROWERS.

Work done at this Station, and which is of interest to grain growers, comprises the test of different varieties of spring wheat, barley, oats, peas, the growing of grain for seed, and the selection of high yielding strains.

THE SEASON AT CAP ROUGE IN 1914.

All the grain was sown in the trial plots by May 19th, so that the spring was an average one as regards earliness. Germination was good, as there was just about enough precipitation from the above date until the end of the month. June was a little too dry, but the rains of the 25th, 29th and 30th came in time to save all vegetation, which would have been parched by the drought which lasted all through July until August 11. The yield, however, was cut down somewhat, but as there was ample precipitation during the latter part of August until harvest, the crop was a fair one.

VARIETY TESTS.

The trial plots of grain are all of ‰-acre and come in a regular three-year rotation where they are preceded by a hoed crop and followed by hay. They are on a very uniform, though not very fertile, piece of sandy loam, with a subsoil of shale about eighteen inches down. The land had received twenty tons of manure per acre in 1913, and was ploughed in October of the same year; during the spring of 1914, it was double disced twice, harrowed, rolled and sown with the horse drill. The plots were rogued and kept free of weeds. The grain did not lodge and was not hurt by fungous diseases, insects, birds or rodents. It was cut by hand, threshed with a special easily cleaned machine, to avoid mixing varieties, and passed through the fanning mill before being weighed. Everything was grown in triplicate so as to avoid as much as possible errors due to irregularities of soil.

SPRING WHEAT.

Four varieties were tested: Early Red Fife, Huron, Marquis and Red Fife. The seed was sown at the rate of 1½ bushels to the acre. Huron was the highest yielder with 1,640 pounds per acre and took 99 days to come to maturity, whilst Marquis ripened first in 96 days and only gave 480 pounds per acre. The average yield for the four varieties was 902 pounds per acre and the average number of days to come to maturity was 98. The average, since 1911, placed Huron at the head with 1,385 pounds per acre and it was only three days later to ripen than Marquis, which gave an average yield of only 955 pounds. Though Huron is bearded and has not such high milling qualities as the other three varieties tried in 1914, it is, here, a much better yielder and it seems the variety best adapted to this district.

The following tables give details about results of 1914 and also of the last four years:—

SPRING WHEAT 1914.

Number.	Name of Variety.	Date of sowing.	Date of ripening.	No. of days maturing.	Average length of straw including head.	Strength of straw, on a scale of 10 points.	length	Yield of grain per acre.		
3	Huron Early R 1 Fife Marquis. Red Fife.	ii 19.	# 22.	99 99 96 98	Inches. 31.6 27.6 13.3 18.3	10 10 10 10	3.2 3.1 1.9 1.9	Lb. 1,640 1,180 480 310	Bush. 24 19 8 5	Lb. 00 40 00 10

SPRING WHEAT 1911-1914.

Number.	Name of Variety.	Number of years under test.	Average number of days maturing.	Average yield of grain per acre.	Aver yield gra per a	l of in	Remarks.	Years under test
2 3 4 5 6 7 8 9 10	Huron Preston. Bobs. Bishop. Marquis. 197 C Yellow Cross. White Fife Early Red Fife. Red Fife. Pioneer (195 F). 86 D 2.	3 9 3 4 2 3 9 7 4 2	103 101 96 96 98 105 99 103 103 101 105 , 109	Lb. 1,385 1,315 1,245 1,215 955 870 825 772 756 673 390 330	Bush. 23 21 20 20 15 14 13 12 12 11 6 5	Lb. 5 55 45 15 55 30 45 52 36 13 30 30	Total failure in 1913 " " Total failure in 1913. Total failure in 1913. " " "	1911-12-13-14. 1911-12-13. 1911-12. 1911-12. 1911-12. 1911-12-13-14. 1912-13. 1911-12-13. 1911-12-13-14. 1911-12-13-14. 1911-13-13. 1911-13.

OATS.

Six varieties were tested: Banner, Daubeney, Eighty Day, Gold Rain, Swedish Ligowo and Victory. The seed was sown at the rate of 2½ bushels to the acre. Gold Rain was at the head with 2,200 pounds per acre and ripened in 85 days, whilst Eighty Day was first ready to cut, 78 days after it was sown, and yielded 1,600 pounds per acre. The average yield for the six varieties was 1,830 pounds per acre and the average number of days to come to maturity was 87. The average, since 1911, places Banner at the head with 2,373 pounds per acre, but it is ten days later than Eighty Day which gave 1,847 pounds. It is clear that where the season is long enough, Banner should be strongly recommended, whilst for the districts where an early frost is to be feared, Eighty Day should be sown.

CAP ROUGE.

In the following tables will be found details about varieties tried at this Station since 1911:—

OATS 1914.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening	Number of Days Maturing.	Average Length of Straw in- cluding Hend.	Srength of Straw on a scale of 10 Points.	Average Length of Head.	Yield of Grain per acre.	Yield of Grain
2 3 4 5	Gold Rain Daubeney Selected Banner Ligowo Swedish Eighty Day Victory	May 19 19 19 19 19 19 19 19	Aug. 12 " 9 " 22 " 18 " 5	85 82 94 91 78 89	33.0 33.3 33.5 33.0 27.5 31.3	10 10 10 10 10 10	Inche 6-1 5-5 6-8 6-0 4-5 5-6	Lb. 2,200 2,000 1,960 1,640 1,600 1,580	Bush, Lb 64 26 58 28 57 22 48 8 47 2 46 16

OATS 1911-1914.

: Number,	Name of Variety	Numberof Years under test.	Average number of days Maturing.	Average Vield of Grain per acre.	Average Yield of	Remarks.	Years under test.
23456789	Banner Gold Rain Victory Daubeney Selected Siberian Ligowo Swedish Twentieth Century Eighty Day Abundance (Garton's) Thousand Dollar	4 4 4 5 4 5 4 5 7	98.0 101.0 96.0 91.2 109.3 105.0 106.3 88.0 106.0 106.3	Lb. 2,373 2,312 2,267 2,030 1,980 1,891 1,890 1,847 1,765 1,550	Bush, Lb. 69 27 68 66 23 58 8 58 8 55 21 55 20 54 11 51 34 45 20	Did not ripen in 1912 Did not ripen in 1912	1911-12-13-14

SIX-ROW BARLEY.

Barley was always a poor crop at this Station until this year when an application of lime more than doubled the yield. Only three varieties were tested: Manchurian, O. A. C. No. 21 and Success. The seed was sown at the rate of 2 bushels to the acre. Success was the highest yielder with 680 pounds per acre and was first ready to cut 77 days after it was sown. The average yield, for the three varieties, was 643 pounds per acre and the average number of days to come to maturity was 81. Manchurian generally does so well everywhere that we recommend it until Success has shown a decided superiority over it.

Some data will be found in the two following tables about six-row barley grown at this Station since 1911:---

BARLEY (SIX-Row) 1914.

Number.	Name of Variety.	Date of Sowing.	Date of Ripen-	Number of days Maturing	Average length of Straw in- cluding Head.	Strength of Straw on a scale of 10 points.	Average length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.
2	Success	May 19	Aug. 2 " 12 " 10 .	75 85 83	20.0 20.7 22.3	10 10 10	Inches. 2.7 2.3 2.5	Lb. 680 660 590	Bush. Ib. 14 8 13 36 12 14

BARLEY (SIX-ROW) 1911-1914.

Name of Variety.	Number of years under Test.	Average Number of days Maturing.	Average Yield of Grain per Acre.	Average of G per		Remarks.	Years under Test.
1 Odessa 2 Success. 3 Escourgeon. 4 Manchurian 5 Black Japan. 6 O. A. C. No. 21. 7 Stella.	3 4 3	88 78 95 88 88 87 88	Lb. 1,305 1,022 1,020 990 795 717 592	Bush. 27 21 21 20 16 14 12	Lb. 9 14 12 30 27 45 16	Total failure in 1913.	1911-12-13-14. 1911-12-13.

FIELD PEAS.

Four varieties were tested: Arthur Selected, English Grey, Golden Vine, and Prussian Blue. The plots were sown on May 19. Arthur Selected came on top with 1,200 pounds per acre and took 91 days to come to maturity, whilst Golden Vine was first ready to cut, 89 days after it was sown, and yielded 1,180 pounds per acre. The average yield, for the four varieties, was 1,172 pounds and the average number of days to come to maturity was 93. The average, since 1911, places Arthur Selected at the head with 2,100 pounds per acre and it was about a day later than Golden Vine which only gave 1,778 pounds. Arthur Selected shows decided superiority over the other varieties tried at this Station and it is strongly recommended to farmers.

CAP ROUGE.

Details will be found in the two following tables about peas sown here since 1911:—

PEAS 1914.

Number.	Name of Variety.	Quantity of seed per Acre.	Date of Ripening.	Number of days Maturing.	Average length of vine molud- ing Head.	Average length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.
2 3	Arthur Selected	Bush. 24 21 21 21 21 21 21	Aug. 18 16 25 23	91 89 98 95	Inches. 28.0 24.3 28.0 30.3	Inches. 2.5 1.8 2.3 2.5	Lb. 1,200 1,180 1,160 1,150	Bush. 1b. 20 00 19 40 19 20 19 10

PEAS 1911-1914.

Number.	Name of Variety.	Number of years under test.	Average number of Days ma- turing.	yield of	Aver yiel of G per A	d rain	Renarks.	Years under test.
2 3 4 5 6 7 8	Arthur Selected. English Grey. White Marrowfat Wisconsin Blue. Golden Vine. Mackay. Black-eye Marrowfat. Chancellor. Prussian Blue. Paragon	4 3 3 4 2 2 2 2 4 2	101 103 101 101 101 82 82 82 104 82	Lb. 2,100 1,913 1,875 1,785 1,778 1,755 1,665 1,560 1,481 1,020	Bush. 35 31 31 29 29 27 26 24 17	Lb. 00 53 15 45 38 15 45 00 41 00	11 11 11 11 11 11 11 11 11 11 11 11 11	1911-12-13-14. 1911-12-13-14 1911-12-13. 1911-12-13. 1911-12-13-14. 1911-12. 1911-12. 1911-12. 1911-12-13-14. 1911-12-13-14.

NUTRIENTS IN DIFFERENT KINDS OF CEREALS.

The following table takes in every plot used for variety tests since 1911, inclusively, and will no doubt be of interest to live stock men:—

DIGESTIBLE nutrients furnished by different grains per acre.

Kind of Grain.	Number of Plots.	Grain per Acre.	Dry matter per Acre.		BLE NUTRIENTS P	ER ACRE.
Barley (six row)	24 46 28 43	Lb. 990 2,011 1,757 932	Lb. 883 1 1801 8 1493 4 834 1	Lb. 83·2 215·2 346·1 82·0	Lb. 646·5 1011·5 866·2 629·1	Lb. 15.8 76.4 7.0 13.9

GRAIN GROWN FOR SEED.

Huron wheat, Banner oats, Manchurian barley, and Arthur Selected peas are the varieties which can be recommended to farmers of this district, and a few acres of each are grown every year for seed. In 1914, the following yields were obtained:—

Huron wheat	2 150	66	6.6	63	**		- 8	***		
Manchurian barley	1.015	26	66	21	8.0	54	-7	**	**	**
Arthur Salacted ness	1 507	4.6	8.6	25	6.6	64	17	66	66 .	

Some of the above was sent to Ottawa to be distributed to farmers, whilst the rest was for sale at the following prices, which are generally the same each year: oats, \$1 per bushel of 34 pounds; barley, \$1.50 per bushel of 48 pounds; wheat, \$1.75 per bushel of 60 pounds; peas, \$2.50 per bushel of 60 pounds.

SELECTION OF HIGH YIELDING STRAINS.

Farmers are getting interested in the work of selecting grain in their fields so as to be able to improve the yield at first and then maintain it at a high standard. We do some work at this Station, in this line, so as to be able to show how simple it is, for many are kept from it by the thought that it is very complicated. To start with, we pass through a field of wheat, oats, barley or peas, and pick about five hundred of the best and most productive looking plants which we can find. Of course, in doing this, we leave aside all plants which are diseased, which have weak straw, which are not of the right type, or which in some way are of inferior quality. During winter we take the grain from each of these five hundred plants, we weigh each lot separately and keep the hundred heaviest lots, which are planted the next spring in as many different rows. This is the well known head-row method of selection. In the fall, we keep separate the product of every row until each lot of grain can be weighed, when we keep the ten best plants from the lots which were the highest yielders. Grain from these ten best plants is again sown in different rows and we keep the product of the highest yielding row for a multiplication plot where it is all sown. The following year there is probably enough grain to grow what will be required for seed in all fields another season. From one of these fields the five hundred heads are chosen and the same thing worked around all over again.

There are several other methods which can be used, but this is rather simple and farmers seem disposed to adopt it. No new types are likely to be found in this way (unless the grain with which we start is unselected) but the varieties will be kept in a very high state of purity; and the results are likely to be much more satisfactory than those obtained by the old method of attempting to maintain productiveness by an occasional change of seed.

Work of this kind has been started with Huron wheat, Banner oats, Manchurian barley, and Arthur Selected peas.

EXPERIMENTAL FARM, BRANDON, MAN.

W. C. McKILLICAN, B.S.A., SUPERINTENDENT.

THE SEASON.

The season of 1914 was unfavourable for cereal crops. The spring, though somewhat backward, was the best part of the season, and up till July 1, crops did well. July and August were extremely hot and dry, and all grain crops were forced into too rapid maturity. As a result yields were distinctly below average.

TEST OF VARIETIES.

The usual tests of varieties of cereals were conducted again in 1914. The system of using duplicate plots for each variety is being continued, and is much more satisfactory than single plots, where any peculiarity of one plot or any accident may destroy the season's results in regard to a variety.

The land used for all cereal plots is a sandy loam. It was summer fallowed in 1913.

SPRING WHEAT.

Four named varieties of spring wheat were tested this year. In addition eleven of the new cross-bred varieties originated by the Dominion Cerealist were tried out under number. No public report is made of these until the best are selected and introduced as desirable varieties. However, it is not expected that any of these will be of value in this section of Manitoba.

The wheat plots were sown on May 1 at the rate of 13 bushels of seed per acre. The results are shown in tabular form as follows:—

SPRING WHEAT-Test of Varieties.

1 Number.	Nume of Variety.	Date of Ripen- ing.		Average length of Straw includ- ing Head.	of Straw on a scale	Average length of Head.	Rust.	Yield Gra per A	in	Weight per measured bush 1 after cleaning.
- 5	Marquis. Pi neer Prelade Red Fife	July 29	96 95 89 102	38 40 37 43	10 8 8 10	3.0	Almost none Rather bad. None Medium	Bush. 36 32 31 22	Lb. 30 35 30 35	Lb. 63.0 59.0 63.2 57.0

Marquis, as usual, makes the best showing. Its lead over Red Fife is much greater than under normal conditions as the season was especially hard on the later varieties. Marquis was well filled and Prelude almost ripe when the hot winds came; Red Fife at this time was at the most susceptible stage.

Pioneer is a new variety introduced by the Dominion Cerealist for dry districts where Marquis ripens too late and where Prelude grows too short in the straw. Pioneer is not intended for and is not recommended for Manitoba.

FIVE-YEAR AVERAGES.

The following are the average results obtained with Marquis and Red Fife for five years, and with the other two varieties for the period they have been under test, viz., four years:—

Variety.	Average Strength of Straw.	Average Number of Days Maturing.	A ver Yie per A	ld
Pioneer (Average of 4 years)		105.0 111.4 102.3 93.2	Bush. 42 37 34 25	1b. 36 23 54 24

OATS.

Fifteen varieties of oats were tested this year. They were sown at the rate of 2½ bushels per acre on May 9. The following results were obtained:—

Oats-Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening	Number of Days Maturing.	Average Leng of Straw, in cluding Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per acre.	Weight per measured bushel
2 Orlo 3 Eigh 4 Vict 5 Gold 6 Ban 7 Gree 8 Swe 9 O. A 10 Gar 11 Sibe 12 Abu 13 Ligg 14 Nev	beney Selected	11 9 11 9 11 9 11 9 11 9 11 9 11 9 11	Aug. 10 " 6 " 9 " 5 " 11 " 10 " 7 " 7	82 82 81 93 89 92 88 92 94 93 92 90 91	Inches. 38 38 37 43 41 39 45 48 41 45 42 44 46 42	10 10 10 10 10 10 10 10 10 9 9 10 10 9 9	Inches. 7 7 7 7 8 8 7 7 8 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 8 7 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 8 7 8 7 8 8 8 7 8 8 8 7 8 8 8 7 8 8 8 7 8 8 8 8 7 8	Bush. Lb. 89 19 88 83 80 15 77 7 75 74 24 72 32 72 27 71 31 71 1 70 25 70 20 70 5 69 14 68 18	Lb. 37.5 34.5 35.5 37.7 39.7 32.5 34.2 37.7 34.0 37.7 34.0 39.7 39.0 38.5

As in the case of the wheat, so also in the oats, the early varieties have had a great advantage in the seasonal conditions. They were fairly well filled when the terrific heat of the last of July made its blighting influence felt. As a result the early varieties, Daubeney and Orloff, are the heaviest yielders this year instead of being nearly the smallest as is usually the case.

BRANDON.

Eighty Day is a new selection made by Dr. Saunders of the old variety named Sixty Day, but which never ripened in sixty days in this climate. Eighty Day appears to be equally as early as Daubeney and Orloff but has not yielded so well this year. Green Russian is a variety which is in local favour in the Morden and Darlingford districts. It is tried here this year for the first time.

Of the varieties grown in recent years the following were discarded this year: Improved American and Irish Victor because they were believed to be identical with Banner, Thousand Dollar because it has not shown any outstanding merit as compared to the best varieties still under test, and Victor (black) because of the low yield and undesirable colour.

FIVE-YEAR AVERAGES.

Twelve of these varieties have been grown for five or more years, and two others for three years. The following are the average results obtained in that time:—

Variety.	Average Strength of Straw,	Average Number of Days Maturing.	Average Yield per acre	
Banner Twentieth Century Gold Rain Swedish Select Victory Siberian Ligowo Daubeney Orloff Regenerated Abundance Newmarket (average of 3 years) Garton's No. 22 (average of 3 years)	Fairly strong. Medium. Fairly strong. Fairly strong. Medium Strong. Strong. Fairly strong. Fairly strong. Fairly strong.	101 6 99 4 100 8 101 0 100 8 100 8 91 6 90 4 100 6 104 3	Bush, 95 93 92 90 90 89 87 85 84 81 93 80	Lb. 33 16 5 6 4 29 16 28 22 25 30 25

From these averages it will be observed that the old reliable Banner variety soill holds its place at the head of the list. While some other sort surpasses it each year, in any average of a number of years its merit shows up. None of the newer kinds surpass it as a reliable variety for all purposes.

BARLEY.

Eight varieties of six-rowed barley and five varieties of two-rowed were tested this year. In addition to the regular test, five new sorts originated by the Dominion Cerealist were tried out for the first time but are not reported.

The barley was sown on May 11 at the rate of two bushels per acre. The hot weather injured barley more than any other grain crop and as a result all yields were lower than usual. The following are the results with six-row barley:—

SIX-Row BARLEY .- Test of Varieties.

Number.	Name of Variety.	Late of Sowing.	Date of Ripening	Number of days Maturing.	Average length of Straw in- cluding Head.	Strength of Straw on a scale of 10 Points.	Average length of Head.	Yield of Gram	Weight per mea sured bushel after cleaning.
2 3 4 5 6 7	Manchurian	May 11 " 11 " 11 " 11 " 11 " 11 " 11	27 28 27 29 29 29 29 29	77 78 77 79 79	35 35 33 36 26 31 32 36	9 9 10 9 8 8	Inches. 2.7 2.5 2.2 2.7 2.5 2.0 2.2 2.2	Bu, lb, 56 37 55 20 54 8 51 32 48 6 46 42 46 32 41 7	Lb. 49·2 49·7 49·5 50·0 62·5 50·2 48·2 49·2

Manchurian, which is first this year, is an improved strain of Mensury and is a highly desirable sort. Garton's No. 68, which stands second, has given consistently good returns ever since it was first tried here three years ago. O. A. C. No. 21 usually a good yielder, with the best straw of any, seemed to be more seriously injured by the heat. An old variety, Yale, grown here for many years has been discarded this year on account of rather low yield and weak straw.

FIVE-YEAR AVERAGES.

Four of the varieties have been grown here for five or more years, one for four years and three for three years. The following are the average returns for these periods:—

Variety.	Average Strength of Straw.	Average Number of Days Maturing.	Avera Yield per	age Acre.
Mensury O. A.C. No. 21. Odessa Mansfield Manchurian (average of 4 years). Garton's No. 68 (average of 3 years). Guymalaye (average of 3 years). Success (average of 3 years).	Fairly strong	87 · 4 86 · 4 88 · 0 88 · 0	Bush. 6 67 65 50 75 71 53 54	Lb. 29 5 19 2 8 46 16 12

The following are the results for 1914 with two-row barley:-

· Two-Row Barley.—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripen- ing.	Number of days Maturing.	Average length of Straw in- cluding Head.	Strength of Straw on a scale of 10 Points.	Average length of Head.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
1 Gold	May 11 " 11 " 11 " 11	Aug. 5	86 84 86 89 84	Inches. 25 35 33 35 35 38	8 5 6 5 9	3 5 4 0 3 0 3 5 6 0	Bu. lb. 55 10 43 31 43 21 34 13 31 7	Lb. 51.7 47.7 50.5 46.5 49.5

Gold is a comparatively new variety introduced from Sweden. It takes the place of Hannehen and is an improved strain of the same stock. It has outyielded all two-rowed varieties each of the three years it has been tried, but is rather weak in the straw. Two-rowed varieties as a class are not as well suited to western conditions as are the six-rowed varieties.

FIVE-YEAR AVERAGES.

The following are the average results for five years of the varieties that have been tried for that length of time, and for three years for the other two:—

Variety	Average Strength of Straw.	Average Number of Days Maturing.	Average Yield per Acre.	
Canadian Thorpe Swedish Chevalier. Beaver. Gold (average of 3 years). Brewer (average of 3 years).	Fairly strong.		Bush. lb. 59 4 58 28 43 16 63 34 58 1	

FIELD PEAS.

Nine varieties of field peas were tested this year. They were sown on May 4; the quantity of seed used varied from one and three quarters to two and a half bushels per acre, according to the size of the peas. The following are the results obtained:—

FIELD PEAS. Test of Varieties.

Number.	Name of Variety	Size of Pea.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw.	Average Length of Pod.		Weight per measured bushel after cleaning.
2 3 4 5 6 7 8	Paragon Prince. Golden Vine. Mackay Prussian Blue Arthur English Grey. Chancellor Solo.	Small Medium Large Medium Small	11 4. 11 4. 11 4. 11 4. 11 4.	Aug. 11 " 10 " 10 " 11 " 7 " 12 " 9 " 9	97 97 98 97 94 99	45 47 47 45 50 28 45 40 42	2·2 2·0 2·0 2·2 2·2 2·2 2·5 2·5 2·5 2·5	Bush. Lb. 36 5 31 50 31 5 30 50 29 10 28 40 28 10 26 45 24 30	Lb. 64.0 64.0 63.7 64.5 64.0 65.0 62.0 64.0 63.0

FIVE-YEAR AVERAGES.

Eight of these varieties have been grown for over five years and the other one for four years. The following are the average results obtained:—

Variety.	Average Number of Days Maturing.	Average per Ac	
		Bush.	Lb.
Aackay	118 4	40	30
rince	118.8	40	19
aragou	119.0	. 40	2
Arthur	111 5	37	19
Prussian Blue	117.2	36	38
English Grey	120 0	36	14
hancellor	117:0	33	30
olden Vine	120.8	32	44
dolo (average of 4 years)	114.6	42	13

Mackay is recommended as a heavy yielder, but in most districts Arthur is preferable on account of its earliness.

FLAX.

Seven varieties of flax were tested. They were sown on May 16 at the rate of half a bushel per acre. The results for this year are as follows:—

FLAX.

1 Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing	Average Length of Plants.	Yield of Seed per acre.	Weight per measured bushel after cleaning.
2 3 4 5 6	N.D.R. 73 Primost N.D.R. 52 N.D.R. 114 La Plata Golden Common	May 16 " 16 " 16 " 16 " 16 " 16 " 16	August 5 11 8 12 6 13 18 14 20 15 8	81 84 82 82 94 96 84	24 25 24 24 17 18 27	Bush. Lb. 17 43 17 18 16 34 15 25 13 32 12 38 12 18	Lb. 55.7 55.5 56.0 56.0 54.5 55.0 55.7

The numbered varieties from North Dakota are the most desirable both in earliness and yield. Golden is a variety that has received a good deal of notice throughout the West in recent years. This is the first time that it has been tried here. The results are not at all in its favour. It is late, short and light yielding.

TWO-YEAR AVERAGES.

Six of these varieties were grown in 1912 and in 1914. The average results of these two seasons are as follows:—

Variety.	Average Number of Days Maturing.	Average Yield per Acre.	
N.D.R. 52 N.D.R. 114 N.D.R. 73 Primest La Plata Common	96.0 95.0 97.0 99.5 105.5 96.5	Bush. lb. 20 5 19 49 18 25 17 53 15 40 14 21	

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

T. J. HARRISON, B.S.A., SUPERINTENDENT.

SEASON.

The season of 1914 was on the whole unfavourable for the production of good cereal crops in southern Saskatchewan. The moisture in the soil from the previous fall and early spring rains caused a good germination of wheat sown on summer fallow. The dry weather which prevailed after the 9th of May, prevented an even germination of the late sown wheat, oats and barley. This also caused a very short growth of straw in all crops. The yield of wheat on the summer-fallowed land would have been fair had it not become frozen on August 9. Because of the dry weather and this frost, harvesting started one month earlier than the year previous and the grain was harvested and threshed without receiving any damaging rains.

SPRING WHEAT.

The variety test of spring wheat was conducted on one-fortieth acre plots. The plots were located on a uniform soil which was summer fallowed the previous year. Only four named varieties were tested, although quite a large number of crossbred sorts supplied by Dr. Saunders were planted. Only the named sorts will be reported. Marquis again demonstrated its ability to mature earlier than Red Fife and yield higher. The Prelude was the earliest sort grown. The Red Fife would have given a higher yield had it not been badly frozen. The plots were sown on April 15 and 16. A system of check plots was employed this season, and the results here published are the corrected, not the actual yields.

Spring Wheat-Test of Varieties (corrected figures).

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	A verage Length of Straw, in- cluding kead.	Strength of straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
1 2 3 4	Red Fife	Aug. 10 15 6 July 23	115 120 112 98	1nches. 42 43 40 36	9·6 5·0 6·0 10·0	3.3 3.5 3.2 2.0	2,943 2,761 1,873	Bush. Lb. 53 14 49 3 46 1 31 13	Lb. 63.2 59.1 63.5 63.0

WHEAT IN FIELD LOTS.

This test was made with the four named varieties. The Marquis wheat is the product of special registered Marquis supplied by Dr. Saunders in 1912; the Red Fife was grown from special registered seed supplied in the spring of 1914.

WHEAT .- FIELD LOTS.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, includ- ing head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.
2 3 4 5 6 7 8 9 10 11	Marquis (Fallow) Red Fife (Fallow) Marquis (Stubble) Marquis (Fallow) Marquis (Fallow) Marquis (Fallow) Marquis (Corn Stubble) Marquis (Stubble) Marquis (Stubble) Marquis (Fallow) Marquis (Fallow)	" 17 May 2 April 16 " 22 " 20 " 21 " 27 " 15 " 25 "	" 18 " 15 " 10 " 10 " 10 " 10 " 10 " 2 " 10 " 10	111 123 105 116 110 110 112 103 105 117 106 96	Inches. 41 44 41 40 44 42 40 39 36 40 40 37	10 3 3 10 9 4 10 10 10 10 10	Inches. 3 0 3 0 3 0 3 0 3 0 3 2 3 2 3 2 3 0 3 0 3 0 2 0	Lb. 2,730 2,452 2,309 2,214 2,070 1,710 1,647 1,583 1,554 1,430 989 986	Bush, Lb. 45 30 40 52 38 29 36 54 34 30 28 38 27 27 26 23 25 54 23 50 16 29 16 26

SPRING WHEAT-FIVE YEARS' COMPARISON OF FIELD LOTS.

The average yield per acre and the time taken to mature Red Fife and Marquis wheat, grown in field lots, under similar conditions for the past five years, are given below. Prelude has only been grown in field lots for three years and the average is given for that time.

Variety.	Average days to Mature.	Days earlier than Red Fife.	Average Yield
Red Fife	131 · 8 · 123 · 6 · 102 · 6	8·2 29·2	Bush. Lb. 2) 43 5 48 6 28 2

OATS.

Sixteen varieties of oats were sown in the spring on the regular one-fortieth acre plots. The seeding was done at the rate of two bushels per acre; the land was summer fallowed the previous year and, due to the very dry season, none of the oats lodged. The frost of August 9 came before many of them were ripe, the result being that a large number took the same number of days to mature. The plots were sown on May 12.

OATS.—Test of Varieties (corrected figures).

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yiel Grain Ac	per	Weight per Measured Bushel after Clean- ing.
				Inc.		Inc.	Lb.	Bush.	Lb.	Lb.
5 6	Victory. Gold Rain Banner. Swedish Select. Danish Island Twentieth Century. Ligowo. O.A.C. No. 72 French Lizo Eighty Day Daubeney. Abundance	August 9	89 89 89 89 89 89 89 89 89 89	41 42 42 42 42 41 43 45 43 35 38 40	9 9 10 10 10 6 9 10 9 9	7.0 6.0 8.0 6.5 8.0 7.5 7.5 7.5 7.0 6.5	3,578 3,493 3,450 3,408 3,25% 3,196 3,025 2,978 2,978 2,940 2,391 2,045	105 102 101 100 95 94 83 87 87 86 70 60	8 25 16 8 8 33 20 20 16 11	40·0 40·0 37·2 38·0 38·6 38·6 38·6 37·0 33·0 36·0 36·0 38·0

FIELD TEST OF OATS.

There were three varieties of oats sown in the field. The yield from the Victory would have been considerably higher had not a large portion of the field been damaged by the cut worms.

OATS .- FIELD LOTS.

Number.	Name of Variety.	Date of Sowing.	Date of	Kipening.	No. of Days Maturing.	Average Length of Straw, including head.	Strength of straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yiel Gr per A	ain
2 3 4 5	Victory (Fallow) Ligowo (Fallow) Banner (Fallow) Banner (Stubble) Banner (Stubble) Banner (Stubble)	11 11 11	15 Aug 18 " 18 " 20 " 2 " 15 "	. 17 13 17 15 10 14	94 87 91 87 100 91	Inches. 45 46 42 40 34 34	9 10 10 10 10 10	8.5 8.0 8.5 8.0 7.0 8.0	Lb. 2,740 2,568 2,164 2,203 1,980 1,497	80 75 72 64 58 44	Lb. 20 18 16 27 8 1

BARLEY.

In the uniform plots of six-row barley seven named varieties and six of Dr. Saunders' numbered cross-breds were tested. The plots were one-fortieth acre in size. The land had been summer-fallowed the year previous. Some of the cross-bred sorts which were hulless failed to germinate. As the seed all tested comparatively high in the germinator and all grain received exactly the same treatment, it is believed that the formaline which was used on the barley was too strong for the hulless sorts. This was a solution of one pound of forty per cent formaline to thirty-five gallons of water. The results of the named varieties are given in the table.

In the variety tests of two-row barley there were seven sorts. They were treated and sown in a similar way to the six-row sorts.

The barley plots were sown on the 11th and 12th of May. Both types are reported on together in the following table:—

Barley.—Test of Varieties (corrected figures).

Number.	Name of Variety.	Type.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Strength of Straw on a scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per meas- ured bushel after cleaning.
2 3 4 5 6 7 8 9 10 11 12	O.A.C. No. 21. Danish Chevalier Oderbruch Swedish Chevalier Stetlla Gold Canadian Thorpe Invincible. Standwell Manchurian Early Chevalier Mansfield Success (beardless).	6 row. 2 " 6 " 2 " 6 " 2 " 2 " 2 " 6 " 2 " 6 " 6	Aug. 9 " 7 " 6 " 11 " 9 " 7 " 11 " 11 " 7 " 2 " 10 July 29	87 87 83 91 87 88 68 91 92 87 82 91	Inches. 37 44 33 38 38 32 35 41 31 31 38 44 32 32	5 9 3 9 5 8 10 10 7 7 2 7	3.0 4.0 2.5 4.0 2.5 3.2 3.5 3.0 3.5 3.5 3.0 3.5 3.5 3.5	Lb. 3189 3039 2875 2775 2776 2603 2524 2510 2248 2247 2202 1884 1087	Bush. L'). 66 21 63 15 59 43 57 39 57 4 54 11 52 28 52 14 46 40 46 39 45 42 22 31	Lb. 48.0 49.0 49.0 46.0 45.0 49.0 46.0 57.0 46.0 57.0 45.3 49.0 44.0 43.0

BARLEY-FIELD LOTS.

Field tests were made of three varieties—Manchurian, O. A. C. No. 21 and Canadian Thorpe. The O. A. C. No. 21 is a very promising barley and does not seem to have the tendency to shell with the wind storms as badly as the Manchurian.

Barley-Field Lots.

1 Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Matur- ing.	Average Length of Straw, includ- ing Head.		Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.
3 4	O. A. C. No. 21 (Fallow)	u 9	11 13 11 13	84 84 90 83 87	Inches. 40 40 36 37 38	5 6 5 6 6	3·2 3·0 3·0 3·0 3·0 3·0	Lb. 2,705 2,640 2,584 2,486 2,352	Bus. Lb. 56 17 55 00 53 40 51 38 49 00

FIELD PEAS.

Ten varieties of peas were tested out in 1914. The Arthur seems to be best adapted to conditions in this district as it matures earlier than the other varieties and gives a fair yield.

PEAS-Test of Varieties (corrected figures).

Number.	Name of Variety.	Size of Pea.	Date of Sowing.	Date of Ripen- ing.	Number of days Matur- ing,		Average Length of Pod.	Yield of Grain.	Yield of Grain per Acre.	Weight per Meas- ured Bushel after clean- ing.
	Prince	Medrum "Small Large M-dium Small	" 1 " 1 " 1 " 1 " 1	Aug. 8 11 9 11 11 11 8 11 5 11 9 11 9 11 6	100 101 100 101 97 98 98 99	38 41 39 40 43 39 43 37 40	2.5 2.2 2.2 2.0 2.5 2.2 2.2 2.0 2.5	Lb. 2,723 2,634 2,294 2,226 2,187 2,043 1,971 1,700 1,619	Bush Lb 45 23 43 54 38 14 37 6 36 27 34 3 32 51 28 20 26 59	Lb. 61 61 62 63 63 62 59 64 61

PEAS-FIELD LOTS.

Only one small field of peas was sown this season. As the Arthur has always proven the earliest only this sort was used, with the following results:—

PEAS.—Field Lots.

Number.	Name of Variety.	Size of Pea.	Date of Sowing		of days Matur-	Average Length of Straw.	Length of	of grain	Yield of grain per Acre.	
	Arthur (Fallow)	Large	April 22	August 7.	107	In. 35	In. 2·2	Lb. 1,315	Bush.	Lb. 55

FLAX.

Ten varieties of flax were sown in the regular one-fortieth acre plots. Of the two varieties, Novelty and Longstem introduced by Dr. Saunders, the Novelty seems to be the more promising. The growth of La Plata and Golden was very short and the crop had to be harvested with a mower. As a considerable amount of the seed was lost it was not deemed advisable to report on the yields.

FLAX-Test of Varieties (corrected figures).

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Matur- ing.	Average Length of Plants.	Yield of Seed per Acre.	Yield of Seed per Acre.	Weight per Measured Eushel after Cleaning.
2 3 4 5 6 7 8 9	Novarossick Novelty. Premost N.D.R. No. 52 N.D.R. No. 73 White Flowering N.D.R. No. 114 Russian Longstem La Plata Golden.	May 21 " 21 " 21 " 21 " 21 " 21 " 21 " 21 " 21 " 21 " 21	Aug. 26 " 26 " 25 " 23 " 25 " 25 " 28 " 28 " 29 " 31 " 31	97 97 96 99 96 96 99 100 102	Inches. 21 20 19 19 19 19 16 24 29 15	Lb. 786 708 590 590 491 454 426 363 354	Bush. Lb. 14 2 12 36 10 36 10 30 8 43 8 6 7 34 6 27 6 18	Lb. 53 53 56 66 66 56 56 56 55

FLAX-FIELD LOTS.

Three varieties of flax were sown in field lots with the following results:-

Number	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average Length of Plants.	Yield of Seed per A.cre.	Yield of Seed per Acre.
2	Premost (Fallow)	21	99	96 100 100	25 23 32	Lb. 784 777 560	Bush. Lb. -14 00 -13 49 -10 00

WINTER WHEAT.

A small field of winter wheat was sown the first week in September but winter killed badly and gave only a small yield per acre.

WINTER RYE.

A field of about ten acres of Prelude stubble was disced in the fall of 1913 and sown to winter rye. It came through the winter in good condition, but, because of the very dry weather, did not give as high yield as in previous seasons. That sown on summer-fallow gave a good growth of straw and a yield equal to any that has been produced.

INDIAN HEAD

6 GEORGE V, A. 1916

SHIPMENTS TO OTTAWA.

A shipment of seed grain was made to the Dominion Cerealist at Ottawa. This was sent to augment his supply for free distribution. This season it consisted of:—

*	Pounds.
Marquis wheat	6,120
Red Fife wheat	
Pioneer wheat	
O. A. C. No. 21 barley	
Manchurian barley	
Canadian Thorpe barley.4	
Victory oats	
Novelty flax	
Longstem flax	
'Arthur peas	
Winter rye:	
Total	22,149

EXPERIMENTAL STATION, ROSTHERN, SASK.

WM. A. MUNRO, B.A., B.S.A., SUPERINTENDENT.

THE SEASON.

It is quite evident that it is the moisture which falls between the first of April and the middle of August that most affects the crop, and a glance at the precipitation records for these months for the past four seasons may give insight into the comparative yields of grain for these years.

Following is the precipitation in inches for the past four growing seasons from April 1 to August 15:—

Month.	1911.	1912.	1913.	1914.	Average for Four Years.
April May. June July Aug. I-16	Inches. 0.86 2.38 3.55 2.89 0.43	Inches. 0 67 2 15 2 81 5 25 0 23	1nches. 0·26 1·26 1 87 3·80 2·24 9·43	Inches. 0 63 1 96 2 00 1 40 0 13	Inches. 0 · 61 1 · 94 2 · 56 3 · 33 0 · 76 9 · 20

During the latter part of June and July the precipitation in 1914 was considerably below the average. The precipitation throughout the whole season is valuable in crop production, but that in June and July seems particularly important. As a consequence the yields of all grains were below the average in 1914.

SPRING WHEAT.

A number of wheats previously tried and found lacking in yield were discarded in 1914. The following is a table showing most of those tried in 1914 together with a comparison of their yields during three previous seasons. The yield is computed from the yield obtained from one-fortieth acre plots in duplicate.

Variety.	of Days ing.	Length of	h of Straw ale of 10 s.	Length of		Average			
v association of	Number Måturi	Average Straw.	Strength on sca Points.	Average Head	1911.	1912.	1913.	1914.	Four Years.
		Inches.		Inches.	Bush.lb	Bush.lb.	Bush 1b.	Bush.lb.	Bush.lb.
Marquis. Bobs. Huron. Red Fife. Prelude Proneer. Kubanka.	103 103 105 105 91 91 107	38 36 37 38 32 39 40	10 10 10 8 10 10	3 3·2 2·7 2 3·5 3	70 00 62 00 73 20 60 00	43 20 36 0 40 40 27 20 29 20 28 40	54 00 57 20 45 20 36 00 24 00 36 00 16 40	51 20 45 40 41 40 31 20 42 00	51 40 51 15 41 15

·6 GEORGE V, A. 1916

The average yield of Marquis wheat on eight acres of fallow in 1914 was 30 bushels 35 pounds and the average for three years under the same conditions is 32 bushels 4 pounds.

The average on six acres of fall ploughed stubble-land in 1914 was 16 bushels 6 pounds, and the average for three years is 20 bushels 14 pounds.

The average on two acres of corn stubble following fallow in 1914 was 38 bushels 17 pounds, and the average for three years is 44 bushels 53 pounds.

It is remarkable that the yield is higher and the maturity earlier on corn ground than on fallow.

One acre of Prelude wheat sown on May 13, and harvested on August 9, yielded 23 bushels 55 pounds. The wheat was of No. 1 Northern quality and it matured in 87 days.

OATS.

Following is a table showing a comparison of nine varieties of Oats, seven of which have been grown side by side during the past four years. They were sown on April 23, 1914, on one-fortieth acre plots, on land which had been fallowed in 1913.

Variety.	Number of Days Maturing.	Average Length of Straw.	Strength of straw on scale of 10 Points.	Average Length of Head.	1911.	Үкыл г. 1912.	ER ACRE.	1914	verage for Four Years.
Abundance. Banner. Victory Twentiet' Century. Gold Rain Ligowo Eighty Day. Danteney O. A. C. 72.	94 94 92 93 91 94 82 82 98	Inches. 38 29 34 31 28 36 25 28 42	10 10 10 10 10 10 10 10	Inches. 6.5 5.0 6.0 5.5 5.0 6.0 5.5 6.0 6.0	Bush.lb. 125 30 131 26 109 14 128 8 127 2 121 6 101 6	94 4 70 20 83 18 65 8 61 6		77 22 73 18 82 32 74 24 83 00	Bush.lb. 107 22 105 15 104 29 101 1 100 26 94 25 84 9

O. A. C. 72, a new variety of oats originated by Professor Zavitz of the Agricultural College at Guelph, and promising well in Ontario, was tried at this station for the first time this year. The yield was higher than that of any of the other varieties under test, but it was the latest of all in maturing, and we would hesitate to recommend it for Northern Saskatchewan until further test is made.

The average yield of Banner Oats on 6 acres of fall-ploughed stubble land was 50 bushels 2 pounds, and the average for three years was 64 bushels 27 pounds.

BARLEY.

Seventeen varieties were tested, thirteen of which are given here together with their yields for the past four years. The yield per acre is computed from the yield on a plot of one-fortieth acre. They were sown on May 2, 1914, on land that had been summer-fallowed in 1913.

SIX-ROW VARIETIES.

Variety.	Days tring.	e Length	th of v on scale Points.	age Length head.			YIE	LD P	ER A	.CRE.			50	rage
	No. of Day Maturing Average L		Strength Straw of 10 P	Average of head	1911. 1912.		12.	1913.		1914.			ars.	
1		Inches.		Inches.	Busl	h.Ib.	Bus	h.lb.	Bus	h.lb.	Bus	h.lb.	Bus	b.lb.
O. A. C. 21 Manchurian Black Japan Taganrog Odessa. Strella Success. Early Indian.	94 94 94 94 94 94 94 83 82	39 38 30 36 36 37 35 23	10 10 10 6 10 10 8 10	4·0 3·0 2·0 2·5 3·5 3·0 2·5 2·0	94 96 93 81 100 83 00 00	8 32 16 32 40 16 00 00	57 55 70 59 44 49 49 00	4 40 40 8 8 8 8 8	73 00 58 53 46 50 31	16 00 16 16 32 40 32 32	75 67 67 67 67 66 32 45	00 24 24 4 4 12 36 40	75 00 72 65 64 62 00 00	35 00 16 15 33 19 00 00

TWO-ROW VARIETIES.

Swan's Neck	92	34	7	2·5	78	16	66	32	74	8	77	4	74	3
Duck Bill.	94	34	10	3·0	80	16	61	32	67	24	66	42	69	4
Early Chevalier	87	38	8	3·5	79	8	54	28	65	00	54	28	63	16
Swedish Chevalier	94	28	4	4·0	71	32	55	40	56	32	53	16	59	18
Beaver.	94	40	8	4·5	70	40	38	15	49	32	45	20	50	15

Early Indian is exceedingly early but short in the straw and a poor yielder, although the very low yield in 1913 is partly due to ravages of birds.

Success is a beardless barley.

Two acres of O. A. C. 21 barley on root ground yielded 37 bushels 35 pounds per acre in 1914 and an average under similar conditions of 45 bushels 35 pounds for three years.

FIELD PEAS.

Ten varieties were under test in 1914, but owing to difficulties in harvesting and threshing, the yields are not to be relied upon. Black-eyed Marrowfat, Prussian Blue, Paragon, and White Marrowfat are all good yielders, but the most satisfactory is the Arthur Select. It is nearly as high a yielder as any and much earlier in maturing.

The following table shows the comparative yield of the ten varieties for the last four years:—

Variety.	Days aring.		of		YIELD PER ACRE.					
	No. of	Length	Length	1911.	1912.	1913.	1914.	Four Years.		
		Inches.	Inches.	Bush.lb.	Bush Ib.	Bush.lb.	Bush.lb.	Bush.lb.		
Paragon. Prussian Blue. Mackay Chancellor Arthur Select Golden Vine. Wisconsin Blue English Grey. Black Eyed Marrowfat Gregory.	111 111 111 108 102 104 111 111 111	36 41 34 28 32 36 32 34 33 32	2·0 1·5 2·2 1·7 2·5 1·5 2·0 2·0 1·7	48 00 46 40 48 00 37 20 51 20 24 40 31 20 38 00 26 20 00 00	43 20 39 20 37 20 36 40 29 20 31 20 32 00 25 20 24 20 33 20	13 20 18 00 16 40 19 20 18 40 23 20 21 20 14 40 16 40 21 20	28 00 23 20 26 40 31 20 24 40 40 00 31 20 26 40 32 40 27 20	33 10 32 50 32 10 31 10 31 00 29 59 29 00 26 10 25 00 00 00		

EXPERIMENTAL STATION, SCOTT, SASK.

MILTON J. TINLINE, B.S.A., ACTING SUPERINTENDENT.

WEATHER CONDITIONS.

The summer of 1914 has been recorded as the driest in the history of the district. the total rainfall from April 1 to August 15 being only 7.22 inches. The rain fell in numerous small showers, and seldom penetrated to the roots of the grain crops. The hot dry winds which prevailed during the period when the crops were heading out, together with the high temperatures, hastened the crops to maturity at the expense of the yield.

TESTS WITH CEREALS.

The cereal tests were conducted on a field that had been summer-fallowed in 1913. The soil is a dark chocolate loam, and very uniform. The plots were one-fortieth of an acre in area.

SPRING WHEAT.

Six named varieties of spring wheat were sown on April 17, at the rate of 13 bushels per acre. The fellowing are the resultant yields:—

Number.	- Variety.	Number of Days Maturing	Average Length of Straw.	A verage Strength of Straw, Scale of 10 Points.	ength of Length of G		Average Yield per Acre, Three Years.
2 3 4 5	Red Fife Marquis. Huron Selected Alpha Selected Pioneer (195 F) Prelude.	118 115 115 115 110 106	Inches, 26.0 24.0 22.0 23.5 25.0 22.0	898999	Inches 2:0 3:0 2:7 2:5 2:0 1:7	Bush, Lb. 20 20 19 — 18 31 18 — 14 20 10 —	Bush. Lb. 27 23 26 23 27 55 22 6 16 20 13 13

OATS.

Seven varieties of oats were sown on May 8, at the rate of 2½ bushels per acre:-

Number.	- Variety.	Variety. Number of Days Maturing.		Average Length of Straw, Scale of 10 Points.		Yield per Acre, 1914.	Average Yield per Acre, Three Years.	
3 4 5 6	Banner Twentieth Century Ligowo (Swedish) Tartar King Abundaoe(Regenerated). Eighty Day Daubeney	99	Inches, 24 30 30 31 30 31 28	9 10 8 10 10 10	7:7 6:5 6:0 7:0 6:0 6:0	Bush. Ltd 51 6 41 6 32 12 32 12 27 2 24 24 22 32	Bush. Lb, 80 32 83 15 85 14 76 18 77 14 65 33 58 33	

BARLEY.

Four varieties of six-row and three varieties of two-row barley were sown on May 1, at the rate of 2 bushels per acre:—

Number.	Variety.	Number of Days Maturing.	Average Length of Straw.	Average Strength of Straw, Scale of 10 Points.	Length of Head.	Yield per Acre, 1914.	Average Yield per Acre for Three Years.	
*2	Six-row. Black Japan. Success (Beardless). O. A. C. No. 21. Manchurian. Two-row.	96 122 101 104	Inches. 22 0 21 0 23 0 22 0	9 8	Inches. 3.0 2.7 2.7 2.5	Bush, Lb, 20 40 15 30 14 28 10 00	Bush. Lb. 31. 16 13. 38 34. 34 30. 13	
1 2 3	Brewer Duckbill. Early Chevalier	106 106 96	21 · 5 21 · 0 22 · 0	8 7 8 -	2·7 2·7 2·0	28 16 25 40 17 4	00 00 50 43 35 16	

^{*}The Success Barley is usually the earliest. This season, however, the late summer rains started a second growth in this variety.

PEAS.

Four varieties of peas were sown on May 1, at the rate of $2\frac{1}{2}$ bushels per acre, and harvested on August 18:—

Number.	Variety.	Yield per Acre of Grain and Straw.	Yield per Acre, 1914.	Average Yield per Acre.	
*2	Chancellor. A Arthur English Grey Golden Vine	Lb. 2080 2920 4320 2200	Bush. Lb. 20 00 18 00 18 00 15 2	Bush. Lb. 24 00 27 16 23 00 23 33	2 years 3 " 3 " 3 "

^{*}The Arthur variety is to be recommended for Northwestern Saskatchewan on account of its earliness, and yield of grain per acre.

SPRING RYE.

One plot of Ottawa selected spring rye was sown on April 17, at the rate of 1½ bushels per acre. The crop was harvested August 6, and yielded 18 bushels per acre.

SUMMARY of Grain, Suitable for Seed Purposes, Grown 1914; and Amounts Sold During Season 1914-15.

Variety.	Amount of Seed Grown 1914.	Amount of Seed Sold 1914-15.	Number of Farmers Supplied 1914-15.
Marquis Wheat Banner Oats. Ligowo Oats. Arthur Peas. Total	Bush. 132 75 114 70 391	Bush. 84 35 45 52 216	5 7 7 12

EXPERIMENTAL STATION, LETHBRIDGE, ALBERTA.

W. H. FAIRFIELD, M.S., SUPERINTENDENT.

REPORT ON CEREALS.

On account of the excessive drought the season of 1914 has been, with the possible exception of 1910, when the area affected was more restricted, the most trying that has been experienced in Southern Alberta, since settlement has taken place. The fall of 1913 was rather dry. Much windy weather was experienced during the late fall and early winter. During January, February, and March the precipitation was heavier, so that when the spring's work began there was a fair amount of moisture in the soil.

The first discing, harrowing, or seeding on the Station occurred March 17. The ground froze up toward the latter part of March, but opened up again shortly and seeding became general about April 4. Unfortunately the rainfall during April, May, and until the latter part of June was very much less than usual. For this entire period, no soaking rain was experienced, what did come was in the form of light showers that were not sufficient to wet through the dry layer of two or three inches at the surface and connect with the moisture lower down. The fact that the total precipitation for April was only 0.5 and for May 0.3 of an inch fully illustrates how serious conditions were and how difficult it was to obtain a stand from seeds when sown. A wet spell during the last ten days of June revived things generally, but the dry, hot July was too severe a strain on plant life and the result was that there was a failure of all grain crops except those on summer-fallow. The last frost in the spring occurred on May 12 when a temperature of 29.8° was recorded. The first frost in the fall was on September 15 when the temperature dropped to 31°.

As in past seasons the varietal tests with the different grains have been carried on both with and without irrigation, and to avoid confusion the report is divided into two parts. The first deals with the part of the farm on which no irrigation is applied.

PART I .- NON-IRRIGATED OR "DRY" FARM.

EXPERIMENTS WITH WINTER WHEAT.

The area seeded to winter wheat in the district was very much smaller than has been the case in past years. This decrease is largely due to drought and to the presence of a disease, quite generally prevalent in the winter wheat fields in the southern part of the province, the exact nature of which has not yet been discovered.

TEST OF VARIETIES.

Ten varieties of winter wheat were sown on summer-fallow on the 3rd of September, 1913. There did not appear to be a great deal of winter-killing, but owing to the dry conditions they never assumed a very thriving appearance in the spring. They did not appear to be diseased to any appreciable extent, but the dry weather during May and early June affected them in a marked degree and they were so advanced when the rains of late June came that they could not recover much and the yield in consequence was lighter than was the case with spring wheat.

WINTER WHEAT (Non-irrigated)—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Matur- ing.	Average Length of Straw, includ- ing Head.	Weight of Straw.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Meas- ured Bushel after Clean- ing.
2 3 4 5 6 7 8 9	Buffum No. 17	11 3	" 19 " 20 " 18 " 22 " 18 " 20 " 18	317 321	1nches. 27 · 0 26 · 0 27 · 0 29 · 0 22 · 5 29 · 0 24 · 0 25 · 0 25 · 0 28 · 0	Lb. 2,505 2,205 2,070 1,680 1,950 1,965 1,755 1,485 1,410	Inches. 3.0 2.75 2.5 3.0 2.5 3.0 2.5 2.5 2.5 3.0	Lb. 1,305 1,275 1,200 1,200 1,080 1,085 1,005 1,005 810	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Lb. 60 0 60 0 61 0 59 0 61 0 59 5 58 0 60 0 60 5 58 0

EXPERIMENTS WITH SPRING WHEAT.

Nine varieties were tested. They were sown on summer-fallow. Considering the very dry season the yields were quite satisfactory. The area of each plot was one-sixtieth of an acre. Only the named varieties are mentioned in the table:—

. Spring Wheat (Non-irrigated).—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Matur- ing.	Average Length of Straw, includ- ing Head.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Meas- ured Bushel after Clean- ing.
234561-85	Early Russian. Marquis Early Red Fife Marquis (Plot for chemist) Huron Bobs Pioneer Kubanka. Red Fife Prelude.	11 66 11 66 11 66 11 66 11 66	11 26 11 26 11 29 11 25 11 24	112 113 112 113 109 108 115 116	Inches. 31.0 30.0 29.0 30.0 31.0 27.0 27.5 34.0 30.0 23.0	3.0 3.5 3.5 3.0 2.7 3.0 2.5 2.5 3.0 2.2	Lb. 1.530 1,470 1,470 1,455 1,455 1,230 1,230 1,170 510	ES 27 25 30 24 30 24 30 24 15 24 15 20 30 20 30 19 30 9 00	Lb. 60.7 62.5 62.0 62.0 62.0 63.0 61.0 62.0 59.7 60.0

EXPERIMENTS WITH OATS.

Ten varieties of oats were tested, being sown on summer-fallow.

OATS (Non-irrigated).—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripen- ing.	Z.	of Straw	of head.	Weight of Straw.	Yield per acre.	Weight per Measured Bushelafter Cleaning.	Average yield for Six Years.
					Inches.	Inches.	Lb.	Bush.lb.	Lb.	Bush.lb.
234561-85	Abundance Banner. Danish Island. Swedish Select (Imp.) Luncoln. Gold Rain. Victory. Irish Victor. Ligowo, Swedish. Daubeney.	" 21 " 21 " 21 " 21 " 21	July 28 " 31 " 31 Aug. 2 " 4 " 4 " 5 " 4 July 24	105 105	26·0 27·0 26·0 31·0 24·0 26·0 22·0 19·5 26·0 19·0	4.7 6.0 5.5 6.0 5.5 4.7 5.0 5.2 6.0	1,860 1,455 1,590 1,695 1,140 1,125 1,050 1,050 1,020 900	60 30 48 33 45 00 36 21 35 10 33 5 30 00 25 20 24 24 22 32	40·0 33·0 36·0 39·0 35·5 35·5 35·6 31·0 32·0	00 00 59 21 60 5 00 00 58 33 00 00 81 23 57 22 00 00 00 00

EXPERIMENTS WITH BARLEY.

Six varieties of six-rowed and six varieties of two-rowed barley were tested. They were all sown on summer-fallow. One feature concerning the results is of some interest, namely that the six-rowed varieties have outyielded the two-rowed. As a rule there has not been much difference between them in the past; in fact, the two-rowed varieties have often outyielded the six-rowed.

SIX-ROW BARLEY (Non-irrigated).—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date or Ripening.	No. of Days Matur- ing.	Average Length of Straw, including Had.	Weight of Straw.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre,	Average for Six Years,	Weight per measured bushel.
2 3 4 5	Odessa	April 21 " 21 " 21 " 21 " 21 " 21	July 28 " 31 " 31 Aug 2 July 31 " 26	98 101 101 103 101 96	In. 23.0 24.0 22.0 24.0 24.5 17.5	Lb. 1,140 1,740 1,695 1,740 1,920 1,36	In. 2 5 2 2 2 5 2 0 3 0 1 7	Lb. 2,040 1,560 1,54: 1,440 1,200 1,155	Bush. 1b. 42 24 32 24 32 9 30 00 25 00 24 3	Bush. 1b. 39 12 32 28 00 00 34 26 00 00 00 00	Lb. 47 45 42 48 40 53

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Two-Row Barley (Non-irrigated)—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw, Including Head.	Weight of Straw.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Average for six Y (ars.	Weight per Measured Bushel aft r Cleaning.
2 3 4	Gold C. E. F Invincible. Swedish Chevalier. Early Chevalier Clifford Duckbill C. E. F	April 21 " 21 " 21 " 21 " 21 " 21 " 21 " 21	Aug. 5 " 5 " 5 July 25 " 31 Aug. 5	105 105 105 94 100 105	In. 17 19 19 25 27 19	Lb. 1,545 1,785 1,770 1,815 2,100 1,680	In, 2.5 2.5 3.5 2.7 3.2 2.5	Lb. 1,455 1,335 1,230 1,185 1,140 960	30 15 27 39 25 30 24 33 23 36	Bush. Ib. 00 00 37 2 37 47 00 00 29 28 00 00	Lb. 52 50 49 50 50 50

EXPERIMENTS WITH PEAS.

Ten varieties of field peas were tested. They were sown on summer-fallow.

Peas (Non-irrigated)—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Avera e Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.	Average age for six Years.
2345678	Picton Prince Golden Vine Arthur Chancellor Mackay English Grey	April 9 9 9 9 9 9 9 9	Aug. 4 3 4 1 July 30 Aug. 5 1	117 116 117 114 112 113 118 114	In. 25.5 26.0 24.0 20.0 23.0 21.0 22.5 21.0	In. 2·2 2·0 2·0 1·5 2·0 1·7 1·7	Lb. 1,260 1,200 1,200 1,170 1,140 1,110 1,110 1,020	Bush. 1b. 21 00 20 00 20 00 19 30 19 00 18 30 18 30 17 00	Lb. 63.5 64.5 63.5 64.0 63.5 63.0 64.0 65.0	Bush. 1b. 00 00 00 00 26 48 23 35 24 2 23 23 00 00 25 16
9	Prussian Blue Solo (Brandon)	11 9	July 26	119 108	23·0 18·0	2.2	1,020 900	17 00 15 00	65·5 64·0	26 33 00 00

FLAX.

All of the flax sown was injured so seriously by the land drifting and cutting the young plants off that no results were obtained. Summer-fallow was used in each case.

PART II (IRRIGATED FARM).

The yields of the varieties of grain under irrigation were quite satisfactory and the quality was excellent.

EXPERIMENTS WITH WHEAT.

Six varieties were tested. They were sown on land that was in roots in 1913. They were irrigated twice, June 3 and July 14.

Spring Wheat (Irrigated)—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening	o. of Days Matur-	verage Length of Straw, including Head.	Weight of Straw.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Veight rer Measured Bushel after cleaning.	Average for seven Years.
Z		<u> </u>	- A	Z				_			
					In.	Lb.	In.	Lb,	Bush. 1b.	Lh.	Bush. 1b.
1	Marquis		6 Aug.	3 119	39.0	3,795	3.5	3,225	53 45	63.5	46 00
2	Marquis (Plot for chemist)	11		3 119	38.0			3,180		63 0	
3	Red Fife	- 11	7 11	3 119	41.0			2,865		63.0	
4	Huron	- 0	7 4	1 117	38.5		2·5 3·2	2,610 2,565		63.5	
5	*Pioneer		6 July 2		38.0			1,87	31 15	60.5	
6	*Prelude	66	6 2	107	31.0	2,655	2 5	1,000	31 13	00 0	00 00

^{*}Shelled a little.

EXPERIMENTS WITH OATS.

Six varieties were tested. They were sown on land that was in roots in 1913. They were irrigated twice, June 3 and July 14.

OATS (Irrigated)—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening	No. of Days Matur-	Average Length of Straw, including bead.	Average Length of Head.	Weight of Straw.	Yield Acre		Weight per Mea sured Bushel after Cleaning.	Aver: Yiel for 7 Y	lď
					In.	In.	Lb.	Bush.	1b.	Lb.	Bush.	lb.
2 3 4 5	Banner Danish Island Irish Victor S we d is h Selected (Imp.) A bundance (Garton's Regen.) Daubeney	" 21 " 21	" 13	112 112 114 113 114 105	39 42 42 37 37 35	7·5 7·5 7·7 7·0 6·5 6 ·0	3,270 3,240 3,465 3,105 2,880 1,770	109 102 '97 93	13 29 27 17 18 24	40.0 39.0 38.0 40.5 41.5 36.0	97 98 00	2 24 12 00 00 00

EXPERIMENTS WITH BARLEY.

Six varieties of six-rowed and six varieties of two-rowed were tested. They were sown on land that was in roots in 1913. They were irrigated twice, June 3 and July 14.

Six-row Barley (Irrigated)—Test of Varieties.

Balance of											
Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing	Average Length of Straw Including Head.	Weight of Straw	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Average for seven Years.	Weight per Measured Bushel.
2 3 4 5	Claude Guymalaye O.A.C. No. 21 Odessa Manchurian Mansfield.	21	Aug. 1 July 28 " 29 " 31 Aug. 1	101 97 98 100 101 102	In. 34.0 26.0 31.5 32.0 34.0 32.0	2,730 2,325 2,640 2,955	In. 2.5 2.5 2.2 2.5 3.0 2.5	Lb. 4,680 3,600 3,255 3,210 3,030 3,000	Bush. lb. 97 24 75 00 67 39 66 42 63 6 62 24	Bush. Ib. 74 15 00 00 00 00 62 37 00 00 59 17	Lb. 48°5 52°0 48°0 52°0 47°0 51°0

Two-Row BARLEY (Irrigated)—Test of Varieties.

Number.	Name of Variety	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw, Including Head.	Weight of Straw.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
2 3 4	Swedish Chevalier Gold (C. E.F.). Invincible Duckbill (C. E. F.). Early Chevalier. Clifford	April 21 " 21 " 21 " 21 " 21 " 21 " 21	Aug. 5 " 4 " 5 " 4 July 27 " 31	105 104 105 104 96 100	In. 33.0 30.0 30.0 36.0 35.0 35.5	Lb. ° 3,540 3,225 3,285 4,005 2,880 3,420	In. 3.0 2.7 2.5 2.5 2.7 3.5	Lb. 4,350 4,185 3,975 3,045 2,610 2,580	Bush. lb. 90 30 87 9 82 39 63 21 54 18 53 36	Lb. 55 55 55 54 53 53

EXPERIMENTS WITH PEAS.

Ten varieties were tested. They were sown on land that was in roots in 1913. They were irrigated twice, June 3 and July 14.

Peas (irrigated).

Number.	Name of Variety.	Size of Plot,	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average Length of Straw.	Average length of Pod.	Yield per Acre.	Yield per Acre.		Weight per Measured Bushel after Clean- ing.	Average Vield for	Deven rears.
						In.	In.	Lb.	Bush.	lb.		Bush.	lb.
1	Prince	1-60 acre			9 122	43	2.0	3,720		00	67.0		39
2	Solo (from Erandon)	11			6 119	45	2.2	3,360		00	64.5		00
3	Paragon	0			8 121	36	2 0	3.240		00	6810 65 0		25 50
. 4	Picton	17			8 121	40	2.0	3,120		()()	68.0		56
	Prussian Blue	11			0 123	40	1.7	3,120		00	66.5		35
6	Mackay	**			5 118	38	1.7	2,880	48	60	65 0		37
	Chancellor	11			6 119	38	1.7	2,850		30	66.0		7
	Golden Vine	H	11 -	0	2 115	38	17	2,750		30	68.0		00
	Arthur Selected	- 11	11		0 123	36	2.0	2,790		30	64.5		36
10	English Grey	- 11	- 17	9 11 1	.0) 120	917	20	2,100	10	00	010	00	00

EXPERIMENTAL STATION, LACOMBE, ALBERTA.

G. H. HUTTON, B.S.A., SUPERINTENDENT.

CEREAL DIVISION.

The season of 1914 was an average one at Lacombe both as to date on which seeding began and general conditions of moisture and temperature. The first grain was sown on April 15, on which date all the varieties of wheat were seeded. The conditions were favourable for growth throughout the season, the first frost occurring on September 1, at which time the bulk of the grain was cut and therefore out of danger. The mean temperature for the summer months was slightly higher than usual and this slight variation towards higher temperatures had a more perceptible effect in hastening maturity of grain than would be expected from the extent of this upward variation of temperature. The precipitation for the months of April, May, June, July and August was 9-905 inches, which proved sufficient for the needs of all cereals.

WINTER WHEAT.

A yield of 33 bushels per acre of Kharkoff winter wheat was secured on Rotation "L." This land was ploughed out of timothy and alsike clover sod in July of 1913, thoroughly worked down with a disc and drag harrow and seeded at the rate of 12 bushels to the acre about the middle of August. It has been our experience that winter wheat sown on sod has been more likely to come through the winter and spring satisfactorily than if sown on summer-fallow.

SPRING WHEAT.

Fifteen varieties of spring wheat were sown on black clay loam which had produced a crop of field roots the previous season. This land was not ploughed after the roots were harvested in preparation for cereals but was prepared by the use of the disc and drag harrows. We find that the ploughing of root ground is altogether unnecessary and that a fairly firm seed bed, particularly for wheat, gives better results than a too open soil. The seed was sown at the rate of three bushels per acre in plots one-fortieth of an acre in size on April 15. Germination was prompt and growth normal throughout the season. Marquis and Prelude are varieties well suited for the conditions in this part of Central Alberta. Those districts in which Marquis is proving sufficiently early should continue to grow that variety. Where an earlier wheat than Marquis is desired, then Prelude should be the variety selected. On a field of eight acres in 1914, Prelude wheat yielded at the rate of twenty-eight bushels per acre and ripened sixteen days earlier than Marquis.

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Only the named varieties are mentioned in the following table:-

Spring Wheat .- Field Lots for Seed.

Number,	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw, Including Head.	Strength of Straw on a scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
234567	Early Russian	A pril 15	Sept. A	144 142 142 144 144 144 142	In. 43 49 43 41 45 48 41 37	5·0 10·0 8·5 9 0 10 0 9·0 6·0	In. 3 0 3 7 3 2 3 2 3 2 3 2 2 7 2 0	Lb. 4,300 3,900 3,800 3,570 3,550 3,490 3,460 2,200	Bush. lb. 71 40 65 00 63 20 59 50 59 10 58 10 57 40 36 40	Lb. 61.0 61.5 60.0 62.0 62.7 58.5 63.5 64.0

Spring Wheat.—Field Lots for Seed.

Variety.	Area.	Total Yield.	Yield per Acre.
Marquis	Acres.	Bush. 234 224	Bush. 39 28

SPRING RYE.

One plot of spring rye was sown on black clay loam soil prepared by the use of the disc and drag harrows following roots in 1913. The plot was sown April 15 at the rate of three bushels per acre and was harvested August 29, and gave a yield of forty bushels and forty pounds per acre.

OATS.

Twelve varieties of oats were tested at Lacombe in 1914. The plots were onefortieth of an acre in extent and were sown on the 16th of April on land which was surface cultivated following field roots in 1913. The amount of seed used varied according to the size of the kernel of the oat from three and a half to four and a quarter bushels per acre:—

OATS.—Test of Varieties.

Number.	Name of Variety.		ing. Of Days Matur-	Straw Including	Strength of Straw on a Scale of 10 Points.	verage Length of Head.	ield of Grain per Acre.	Yield of Grain per Acre.	eight per measured Bushel after Clean- ing.
1 2 3 4 5 6 7 8 9 10 11	Banner Danish Island Irish Victor Siberian Victory Tartar King Swedish Select Re enerated Abundance Gold Rain Daubeney Eignty Day Ligowo	Aug. 29 Sept. 4 Aug. 29 Sept. 4 Aug. 29 Sept. 4 22 Aug. 29 20 20 17 6 29	137 143 137 143 143 141 137 137	In. 49 5 49 0 49 0 48 0 48 0 47 0 53 0 42 5 38 3 49 0	10·0 10·0 10·0 9·5 10·0	8·2 9·0 8·0 8·0 10·0 8·0 7·7	3,600 3,400	Bush. 1b. 116 16 105 30 100 10 97 32 96 16 96 16 88 28 88 18 69 14 68 8 56 26 56 16	Lb. 44·0 43·5 45·0 43·5 42·0 44·0 45·5 43·5 41·0 37·5 42·0

OATS .- Field Lots for Seed.

& . Variety.	. Area.	Total Yield.	Yield per Acre.
BannerAbundance	Acres. 4 · 25 · 35 · 0	Bush, , 272 1,925	Bush. 64 55

BARLEY.

Ten varieties of six-row and five varieties of two-row barley were tested in 1914. Seed was sown April 16, at the rate of from three to three and one-half bushels per acre. The land—a clay black loam—having been in roots in 1913 was not ploughed, but disced and drag harrowed before being sown. All plots were one-fortieth of an acre in extent. The quality of the grain produced in 1914 was excellent. Only the named varieties are mentioned in the tables.

Two-row Barley.-Test of Varieties.

' Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	H Average Length of Straw, Including Head.	Strength of Straw on a Scale of 10 Points.	Head.	Yield of Grain per	Yield of Grain per Acre.	Weight per Measur- ed Bushel after Cleaning.
3	Swedish Chevalier	April 16 " 16 " 16 " 16 " 16	" 20 " 28	136 128 136 125 125	36 0 38 0 32 0 46 5 44 5	7:0 8:5 10:0 8:5 8:0	3·2 3·2 2·2 3·7 3·0	4,120 3,430 3,420 2,220 2,200	85 40 71 22 71 12 46 12 45 20	54 53 55 53 53 52

SIX-ROW BARLEY.—Test of Varieties.

Num er.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw, Including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
3 4 5	VI ansfield Odessa Manchurian O. A. O. 21 Stella Guymalaye. Success (beardless)	" 16 " 16 " 16	Sept. 4 Aug. 28	128 1 129 1 129 1 143 1 136	In. 40.5 39.0 44.0 48.0 45.0 32.0 38.5	8.5 6.0 9.5 9.5 10.0 9.0 6.0	In. 2:7 3:2 4:5 3:0 4:2 2:5 2:7	Lb. 3,500 3,450 3,320 3,230 2,830 1,660 480	Bush. 1b. 72 44 71 42 69 8 67 14 58 46 34 28 10 00	Lb. 53 55 50 51 52 69 49

FIELD PEAS

Cutworms destroyed the growth of all crops of peas, therefore it is impossible to report upon them. An acre of Arthur peas produced a yield of thirty bushels per acre. It is believed that this variety will be found valuable for sowing with oats for the production of green feed. Stock men occasionally raise the objection that the mixing of peas with oats for green feed, considering the cost of seed peas, is prohibitive. It is expected that Arthur peas will ripen almost invariably, and if a small area of peas alone were grown for the production of seed it would overcome this objection.

SUB-STATIONS IN ALBERTA.

ST. BERNARD MISSION, GROUARD, ALBERTA.

Rev. Bro. Laurent, Experimentalist.

THE SEASON.

The summer and autumn of 1913 were so wet that it was impossible to prepare the land in any way for the crops of this year until the 18th of April, when ploughing was commenced.

Seeding was finished early in May, and a few days of warm weather caused the grain to germinate quickly. During the latter half of May the young plants suffered somewhat from the violent winds which continued without intermission until the 3rd of June. On June 4 there came a heavy rainstorm, after which the growth of cereals was rapid. Barley began to head out at the end of that month. Wheat and oats were in head by July 15.

SPRING WHEAT.

Prelude yielded 25 pounds from 5 pounds of seed, and was ripe on August 20. The threshed wheat weighs 62 pounds to the measured bushel.

Early Red Fife, sown April 30, on stubble, was ripe August 18, and gave 27 bushels per acre.

Marquis, sown May 1, on stubble, was ripe August 26, and yielded 29.25 bushels per acre. Weight of a measured bushel, 59 pounds.

Preston, sown May 1, on stubble, was ripe August 26, and yielded 28 bushels per acre.

OATS.

Eighty Day, sown April 30, was ripe on August 1. The total yield, from 4 pounds of seed, was 45 pounds, and the weight per measured bushel was 27 pounds.

Abundance was ripe on August 16. Four pounds of seed yielded 40 pounds; and the weight per measured bushel was 35.3 pounds.

Banner, sown May 2, on stubble, was ripe on August 15, and yielded 45 bushels per acre.

BARLEY.

Manchurian barley sown on the 2nd of May was ripe on the 10th of August, and yielded at the rate of 40 bushels to the acre. Weight of a measured bushel 44.8 pounds.

EXPERIMENTAL STATION, FORT VERMILION, ALBERTA.

R. Jones, Manager.

THE SEASON.

April opened with rough weather, but turned fine towards the end of the month. Seeding commenced on the 30th. May was dry, with considerable wind. June was somewhat dry, but there was enough rain to cause a good growth of cereals. Further rains occurred early in July, but the month as a whole was dry and hot. August was quite warm and rather showery. Harvesting commenced on July 22.

SPRING WHEAT.

Nine varieties were tested in one-thirtieth acre plots, on land on which roots had been grown the previous year. The seed was sown on April 30 and May 1 at the rate of 13 bushels per acre.

Spring Wheat-Test of Varieties.

Number.	Name of Variety.	of		. 18 1		Average Length of Straw Includi ng Head Strength of Straw on a Scale of 10 Points.		Yield of Straw per acre.	Yield of Grain per Acre.	Weight p-r Mensured hushel after Cleaning,
2 3 4 5 6 7 8	Bishop La loga Early Riga Red Fife Marquis Preston Prelude Kubanka Stanley	May April 3 May "" "" "" ""	1 11 11 11 11 11 11 11 11 11	12 104 100 102 7 99 18 111 14 106 105 96 112 111 103	In. 38 39 36 42 40 36 39 44 36	5 5 10 7 10 5 10 5	In. 3 0 3 0 3 0 3 2 3 0 2 5 2 5 3 5	4,200 4,320 4,640 5,220 5,760 3,960 5,280	Bush. 1b, 63 00 57 00 56 30 52 00 51 00 50 00 49 00 46 00 44 00	Lb. 63°4 60°8 61°5 64°0 62°8 63°2 00°0 61°0

OATS.

Five varieties were sown. The plots were one-thirtieth of an acre. The previous crop was corn, for which manure had been applied. The land was ploughed in the fall of 1913 and well worked up in the spring of 1914. The oats were sown on May 2 and 4 at the rate of $2\frac{1}{2}$ bushels to the acre.

OATS.-Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Matur- ing.	Average Length of Straw including Hea!	Strength of Straw on a Scale of 10 Points.	Average length of Head.	Yield of Straw per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after Clean- ing.
2 3 4	Excelsior B'ack Tartar King Imp. Ligowo Banner Black Mesdag.	" 4 " 4	11 6	98 94 96 93 82	In. 42 46 48 43 40	10 6 10 7 5	7:0 9:0 9:0 7:0 8:5	Lb. 7,203 7,200 7,200 7,200 7,800 4,500	Bush. 120 107 100 98 60	1b. 00 23 20 28 00	Lb. 39.5 38.5 39.2 38.0 30.4

BARLEY.

Four varieties of six-row and two of two-row barley were tested this year in one-thirtieth acre plots, on land on which potatoes had been grown the previous year, and which had been manured in the spring of 1913, ploughed the following fall, and well worked up in the spring of 1914.

The barley was sown on the 6th and 7th of May (except Hulless White which was sown on May 21) at the rate of 24 bushels to the acre.

BARLEY .- Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.		No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yi-ld of grain per Acre.	Yield of per a		Weightper measured bushel after cleaning.
	Six Row— Claude Mensury Hulless Success	" 2	July Aug.	· 30 1 21 28	85 87 92 83	1n. 40 36 36 -36	7 5 7 5	In. 3.0 2.5 2.5 3.0	Lb. 4,860 5,280 6,060 2,400	57 55 53 51	1b. 21 00 36 12	Lb. 45.0 48.0 65.1
1 2	Two Row— Canadian Thorpe Sidney	May	Aug.	3 15		40 36	7 5	2·7 2ə5	4,820 4,260	62 61	24 12	52·4 53·0

PEAS.

Two varieties of peas were sown. Arthur gave good results. It was sown on May 5 and harvested on August 10, and gave a crop at the rate of 45 bushels per acre.

BUCKWHEAT.

Two varieties of buckwheat were tested, Silverhull and Japanese. These were sown on May 21. The Japanese was quite green when frost occurred on September 7. The Silverhull was ready to cut August 26, and yielded at the rate of 40 bushels per acre.

FORT VERMULION.

EXPERIMENTS AT FORT RESOLUTION, MACKENZIE DISTRICT.

The winter was long and severe, and spring was late. Soil conditions were, however, satisfactory when the warmer weather came.

Seeding was done from the 20th to the 30th of May. The weather in June and July was very favourable but August was rather cool. Severe storms were experienced early in September.

The harvest was gathered between September 15 and 20. The first very severe frost was on September 22.

The following varieties of cereals were tested:-

· Spring Wheat-Marquis and Prelude.

Oats—Eighty Day.

Barley-Manchurian.

They were all sown on May 22 and cut on September 17.

EXPERIMENTAL STATION, INVERMERE, B.C.

GEO. E. PARHAM, SUPERINTENDENT.

Arrangements have been completed to commence variety tests of cereals at this station next season. A suitable piece of land has been set apart for this purpose.

Two principal series of tests will be carried on, in one of which a greater amount of water will be applied than in the other. These experiments will include varieties of wheat, oats, barley and peas.

EXPERIMENTAL FARM, AGASSIZ, B.C.

P. H. MOORE, B.S.A., SUPERINTENDENT.

WEATHER.

In April of this year we had less than three inches of rain and seeding was commenced about the same time as usual. The first seeding was done on April 18 and all plots were sown by the night of April 22. The month of May was comparatively dry and bright; June was wet in the fore part and a heavy shower occurred on the 27th. From this shower in June until the grain was cut in August, there was not enough rain to settle the dust. Below we give a table showing the precipitation, temperatures, etc., during the growing season.

1914.	1914. , April.		June.	July.	August.	Totals.
	2 94 inches. 143 hrs. 54 min.	3.55 inches 202 hrs.	5·18 inches 176 hrs. 18 min.	0.15 inches 246 hrs. 54 min.		11 82 inches 810 hrs. 24 min.
Highest temperature Lowest temperature Mean monthly temperature	72° 31° 51·55°	85° 36° 56·28°	87° 41° . 52°91°	87° 39° 62 075°	80° 44° 77·16°	Averages. 82 2° 38 2° 59 99°

Such a season gave very good results until the grain headed out, but from that time the ripening was too much hastened to secure the largest yields. However, the colour and quality of the straw and grain could not be surpassed, and both were much above the average for this valley.

LAND AND TREATMENT.

The cercal variety test plots, with the exception of peas, were put on a piece of sandy loam in the northeast section of the Farm. This piece of land had for many years been under orchard. In 1911 it was spring ploughed, sown to cats, and seeded to clover. In 1912 it was pastured and fall ploughed; in 1913 it was dressed with 16 tons of barnyard manure and 600 pounds of chemical fertilizer per acre and planted to mangels. In 1914 it was spring ploughed, harrowed, rolled and seed sown in plots, and the whole seeded down to clover.

The peas were sown on a piece of fall ploughed pasture land of sandy nature, which did not have an application of manure of any kind.

Smut did not make an appearance this year, but, as usual, all grains subject to it were given the formaldehyde treatment.

FORMALDEHYDE TREATMENT OF GRAIN.

The method used at this farm in combating smut in grain is as follows:—

The grain is immersed in a solution of one-half $(\frac{1}{2})$ pint of formaldehyde to 40 gallons of water; the solution is put in a barrel and the sacks of grain are allowed to stand in it until they become thoroughly soaked. The barrel is constantly kept covered with a wet sack to prevent the formaldehyde from evaporating. After being treated, the grain is spread on a dry floor, and when dry is sacked up.

SPRING WHEAT.

On account of the semi-failure of this crop for the past few years, caused by the "wheat midge," the test plots were discontinued in an effort to try to starve out the insect; but it was found that the insect lived on the barley in sufficient numbers to perpetuate its species.

OATS.

Fifteen varieties of oats were tested. Owing to the very dry weather just when the oats were filling, the yields are lighter this year than usual. The highest yielder this year was Gold Rain, which gave 65 bushels per acre. It matured in 104 days, which is the usual length of time for the earlier varieties, such as Eighty Day and Daubeney. All varieties matured in an average of 104 days, which is 11 days earlier than last year's average. The Eighty Day was the earliest maturing and lightest cropping variety. It yielded only 31 bushels per acre, and matured in 96 days. The second highest yielder was a Danish variety, Gul-Nesgaard. This variety matured in 110 days, which was the longest growing period except that of Lincoln. The two varieties, Gold Rain and Gul-Nesgaard, took the leading positions this year, supplanting last year's leaders, Lincoln and Danish Island. The other varieties about held their respective positions with last year's results.

Four varieties were sown for hay but gave very light yields. The varieties used for this purpose were Swedish Select, Banner, Ligowo and Daubeney. They yielded according to the order named, which was a repetition of their performance last year.

Swedish	Select1	ton	1,120	pounds	per	acre.
Ligowo.	1	ton	1,000	4.6	66	46
	1				66	
Daubene	y1	ton	460	66	66	66

OATS .- Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
2 3 4 5 0 7 8 9 10 11 12 13	Lincoln. Banner Irish Victor. White Wave. Ligowo Danish Island.	Apr. 2:	11 10 1 5 1 5 1 5 4 July 28	110 104 103 111 106 104 110 103 105 105 104	In. 41 46 42 46 44 40 44 42 44 42 44 42 41 37	3 10 10 10 10 9 9 9 10 9 8 10 10 10	In. 10 8 10 10 9 10 9 8 9 8 10 9 7 7	Lb. 2,220 2,040 1,980 1,920 1,860 1,860 1,800 1,740 1,740 1,680 1,680 1,620 1,380 1,260 1,080	Bush. Lb. 65 10 60 00 58 8 56 16 54 24 54 24 52 32 51 6 51 6 49 14 49 14 47 22 40 20 37 2 31 26	Lb. 40.8 38.5 37.0 39.0 38.8 37.5 35.8 37.4 37.2 38.3 38.5 36.8 36.8 36.2 34.6

BARLEY.

TWO-ROW BARLEY.

Six varieties of two-row barley were tested this year, of which the Danish Chevalier was the highest yielder. Beaver was the next highest, and both varieties took the longest period to mature, namely 103 days.

SIX-ROW BARLEY.

Eight varieties of six-row barley were tested. This season most of the six-row varieties outyielded the two-row sorts. This is not always the case at this farm. The varieties Trooper and Odessa headed the list this season, each yielding 46 bushels per acre. All varieties of barley gave higher yields and better quality of seed than they did last year.

Following is the table giving particulars regarding yield, etc.

BARLEY-Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Matur-	Straw, Including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per-	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
123456	Two-Row— Danish Chevalier Beaver Gold Swedish Chevalier Canadian Thorpe Invincible.	April 22 11 22 12 22 11 22 12 22 11 22	Aug. 4. 1 4, 1 1/2 39. Aug. 3 1 1 1 3	104 104 99 103 101 103	In. 42 41 36 45 43 46	9 7 8 8 10 9	In. 4:0 3:0 2:5 4:0 3:5 4:0	Lb. 2,160 2,100 1,980 1,920 1,860 1,740	43 56 41 12 40 00 38 36	Lb. 53 1 54 0 54 4 53 6 53 2 52 0
1 2 3 4 5 6 7 8	Six-Row— Trooper Odessa Mansfield O. A. C. No. 21 Oderbruch Danish Tystoffe Prentice. Manchurian Success	April 22 n 22	25 28 27 24	100 94 97 96 93 104 96 89	33 40 44 40 42 44 40 38	9 9 10 10 10 10 9 8 9	3·0 2·5 4·0 3·0 3·0 3·0 3·0 2·5	2,220 2,220 2,100 2,040 2,040 2,040 1,860 1,320	46 12 46 12 43 36 42 24 42 24 42 24 42 24 38 36 27 24	52·4 50·8 49·4 45·3 50·0 53·0 44·4 43·5

PEAS.

Nine varieties of peas were tested. They were sown on April 18 and matured between August 3 and August 10, a period varying from 107 to 114 days. The straw was shorter than usual this year, but the crop of grain was up to the average.

The highest yielder was Solo, giving 53 bushels (3,184 pounds) per acre; next in order of yield was Golden Vine with 50 bushels (3,000 pounds) per acre; and the third

was Prussian Blue, yielding 46 bushels (2,760 pounds) per acre.

One variety of vetch was grown. This was procured in Sweden and is called Improved Swedish Vetch. It made an excellent growth but the seed ripened unevenly and some was lost in harvesting. The yield was 19 bushels (1,140 pounds) per acre.

PEAS-Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw.	Average Length of Pod.	Vield of Grain per Acre.	Yiell of Grain per Acre.
2345678	Solo	Medium.	" 18 " 18 " 18 " 18 " 18 " 18	" 3 " 5 " 8 " 10 " 10 " 3	108 107 109 112 114 110 114 107 107	1nches. 45 45 48 48 46 50 46 46 41	3.0 2.5 2.5 3.0 3.0 3.0 3.0 3.0 2.0	Lb. 3,184 3,000 2,760 2,760 2,700 2,640 2,640 2,580 2,220	Bush, Lb. 53 4 50 00 46 00 45 00 45 00 44 00 44 00 43 00 37 00

EXPERIMENTAL STATION, SIDNEY, B.C,

SAMUEL SPENCER, FOREMAN MANAGER.

CEREALS.

Five varieties of winter wheat, three of winter rye, three of spring wheat, three of oats and two of barley were tested on plots of ½2 of an acre each, the crops being the first grown on new land. Some plots had been heavily graded and a very thin layer of soil left on the clay sub-soil. All the plots were sown on October 27, and were ripe July 22.

FALL WHEAT AND FALL RYE-Test of Varieties.

=					
No.	Variety.	Soil.	Weight of Straw per acre.	Yield of Grain per acre.	Weight of measured bus, after cleaning.
12345	Fall Rye. Mammoth White Dominion	Black Loam """ Thin black loam on clay sub-soil. Black Loam Thin black loam on clay sub-soil	Lb. 6,842 7,590 6,050 4,356 4,620 7,320 4,906 6,820	Bush. 46 5 43 0 38 7 30 5 -20 0 36 5 32 5	63 0 63 5 64 0 63 0 63 0 63 0 63 0 60 0

SPRING WHEAT, OATS AND BARLEY—Test of Varieties.

No	Variety.	Soil.	Date of Ripening.	Days Maturing.	Weight of Straw per acre.	Yield of Grain per acre.	Weight of measured bushel after cleaning.
	Spring Wheat,				Lb.	Bush.	Lb.
1 2		Thin black		101	. 3,750	35.0	61.0
3	Red Fife	loam on clay sub-soil	" 7	101 101	2,700 3,200	27·5 27·5	59·0 58·0
1 2 3	Oats. Victory Banner. Daubeney		July 29 Aug. 5 July 22	97 99 85	6,800 6,710 6,710	68 0 66 0 60 7	42·0 42·2 42·0
1 2	Barley. Manchurian (6 row) Canadian Thorpe (2	Thin black	July 22	8ŏ		30.0	50.0
	row).	loam on clay sub soil	30	93		23.7	53 0



DOMINION OF CANAD DEPARTMENT OF AGRICULTURE DOMINION EXPERIMENTAL FARMS

REPORT

FROM THE

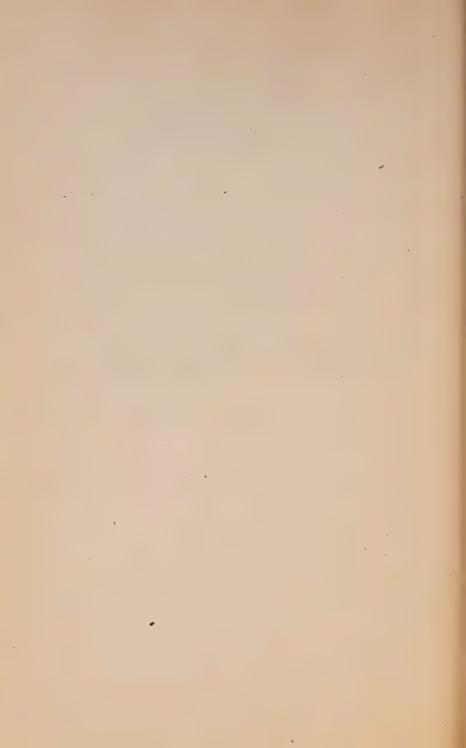
DIVISION OF BOTANY

FOR THE

Fiscal Year Ending March 31, 1915

PREPARED BY

The Dominion Botanist - - - - - - - - - - - - H. T. Güssow.



REPORT OF THE DIVISION OF BOTANY

H. T. GÜSSOW, DOMINION BOTANIST.

OTTAWA, March 31, 1915.

The Director, Dominion Experimental Farms,

SIR,—I have the honour to submit herewith the sixth annual report of the work carried on by the staff of the Division of Botany.

The year's work was greatly increased through special attention being paid to the administration of the Destructive Insect and Pest Act.

The Field Laboratory of St. Catharines, Ont., now established long enough to show the first results, is proving a real benefit to that district. In charge of Mr. W. A. McCubbin, M.A., a very able and enthusiastic colleague, the work is being highly appreciated by the many who have availed themselves of the advantages of the information and demonstration afforded.

The field station occupies a very useful part in the educational work from both the advisory and the practical demonstration points of view. In numerous instances, farmers and fruit growers who sought advice could be visited from such field stations and their problems be studied on the spot, which is always far more satisfactory than by correspondence, often enough the only alternative means of giving advice.

Field laboratories are not only the most satisfactory means of assisting the public, but are the principal means by which work of so highly scientific a character as that of

plant pathology can be rendered useful.

Considerable attention was paid to the investigation and study of potato diseases, with a view to finding measures for their control which would not interfere too much with ordinary farm practice. The most important fact, so far as the control of potato diseases is concerned, is that farmers always appear very confident of "never planting diseased potatoes," whereas it is our experience that this is still far too frequently done, and the sooner this is realized the better. Farmers are warned that the care which at present they believe they exercise is by no means sufficient.

It is our duty and desire to render the work of this Division of the most useful nature possible. It should be remembered that we are working only for the benefit of the farming public. We have generally found that personal instructions, when paying visits to certain farming localities, prove of great value. Visits of farmers to our laboratories are always welcome, and, when we have had the pleasure of having them with us at Ottawa, they generally become valued correspondents and co-operators.

For convenience sake, this report is divided as usual into several sections, viz.:

1. Destructive Insect and Pest Act; 2. Plant Pathology; 3. Economic Botany;

4. Report from Branch Laboratory at St. Catharines, Ont.; 5. General.

1. ADMINISTRATION OF THE DESTRUCTIVE INSECT AND PEST ACT.

In last year's report we recorded the fact that the United States Government had placed an embargo on all countries, including the Dominion of Canada, where the disease "Powdery Scab" existed.

Raicing of the embargo.—During the latter half of the month of June, the Dominion Botanist conferred with officials of the United States Department of Agriculture with a view to securing the raising of the embargo on potatoes. Arrangements were made by which potatoes would be allowed entry into the United States, until such time as potatoes affected with powdery scab should be found in any consignment from Canada.

Considerable time was spent in the preparation of the necessary regulations to carry on inspection and certification of all potatoes from the infected countries. A number of inspectors were appointed, who received special training at the Central Laboratory until they were found to possess the necessary knowledge requisite for the

carrying out of the regulations.

The inspection of potatoes commenced in December, 1914, in the Province of New Brunswick and was directed from Ottawa. Mr. Rolf Holmden was placed in charge of the inspectors, and he has administered the regulations in as satisfactory a manner as could possibly be done. To Mr. Holmden's efforts is largely due the success of the work as far as could be expected from the regulations in force, which, it must be understood, were essential to the raising of the embargo.

The following is an account of the work carried on during the year under the

Destructive Insect and Pest Act appropriation.

Field and cellar inspections of potatoes in 1914.—In order to secure accurate data of the distribution of powdery scab, a number of inspectors were instructed to make a careful survey of the potato-producing regions of Ontario. It is interesting to note that, although no doubt a fair quantity of seed potatoes used in the Province of Ontario came from New Brunswick and the United States, where powdery scab is known to exist, no indication whatever has been found that powdery scab is established in Ontario.

In Ottawa, where we have carried on a series of experiments with powdery scabunder field conditions, we have not secured any results; no powdery scab made its appearance during two years of experiments. It is not possible at present to explain

this curious result.

Field inspection.—During the summer months, inspection of field crops was carried on in the Maritime provinces. The object of this inspection is to keep a check on places where the disease has previously been found, and to ascertain whether farmers follow the instructions given to them concerning the prevention of this disease, and with what success.

It is gratifying to be able to report a marked improvement in this direction. No new outbreaks of disease had occurred on any of the farms visited, the farmers having

followed the instructions left by the inspectors the previous year.

Since the inspection in 1912-13 of the farms of Prince Edward Island, we have been able to learn an instructive lesson. Fifty-one cases of powdery scab were located on as many different farms. On revisiting these farms in 1914, it was found that only four farmers had followed the instructions given to all of them. Of the four who had followed instructions, three had no disease on their farms, while one had evidently planted infected seed without being aware of it. This will plainly show, that, where the instructions are being followed, powdery scab is unlikely to reappear, and it also shows that it is not a difficult disease to prevent if farmers will only follow advice.

In fully 80 per cent of the instances where powdery scab has been located, the farmers have declared positively that there has been no change of seed or introduction of new strains for ten, fifteen, or even twenty years, and they were positive that.

powdery scab had affected their tubers for years.

One possible source of infection may be traced to the use by farmers of bags furnished them by the potato shipper, and previously used for handling potatoes. It is one of the practices of the trade to procure old bags from second-hand bag brokers, regardless of the use to which these bags might previously have been put, when shipping to order consignments of potatoes in bags; another custom is to have an equivalent number of bags returned them by the consignee. These bags are not infrequently distributed to farmers and potato growers for bagging potatoes in their cellars or potato houses. It is, therefore, not improbable that at some time or other these bags or sacks may have contained infected tubers, become contaminated with the spores, and thus become the means of carrying infection.

There can be no doubt of the part played by potato planters and diggers as disease-carrying agents. Instances where disease has evidently been carried from farm to farm by the joint use of such implements are common enough.

Railway cars used for the transportation of potatoes, which have been insufficiently cleansed and disinfected before being again used for potatoes, are another possible source of contamination.

The prevalence of minor potato diseases, other than powdery scab, in field crops was very noticeable, and the use and value of seed treatment and spraying were constantly emphasized. Such diseases as Early Blight, Late Blight, and Rhizoctonia were frequently in evidence; and in many sections of New Brunswick and Prince Edward Island, Black Leg and Leaf Roll were observed.

Potato storage conditions very imperfect.—The indifference to the proper storage of potatoes was a feature that was constantly brought before the inspectors. Very few farmers seem to appreciate the value of a well-ventilated, cool, dry potato cellar. As a general rule, they store this crop in cellars beneath the farmhouse; these cellars are not infrequently without floor other than the original soil, and are often without any other walls than the mud sides, or, where there are constructed walls, these are of stone, and in the cold of winter are continually damp. In many instances, the cellars are so poorly drained, that water lies in puddles on the floor after heavy rains in the spring or fall; it is the rule more frequently than the exception to find no provision whatever made for ventilation, with a resulting damp, unhealthy atmosphere, the temperature of these cellars frequently standing at 60° F., conditions totally unsuited to the successful storing of potatoes, and decidedly undesirable, from a sanitary point of view, for the occupants of the house above.

It is estimated that the loss from rots, due to these improper methods of storing, is fully 17 per cent (and often much more) of the entire amount stored. These conditions are general in every province visited; wherever they have been found to exist, farmers have been advised to build a potato house, if the size of the crop warranted it, or to divide the cellar into bins, with close board partitions, and raised, open, board floors made of 1 inch boards laid 1 inch apart and raised from four to six inches above the cellar floor. This would allow a certain amount of ventilation, at the same time keeping the potatoes from contact with ground water; ventilators to carry off the foul air, and prevent its rising into the house above, were also recommended.

During the latter half of October, Mr. Adams visited Prince Edward Island, and addressed meetings of farmers at the following places: Montague, Souris, St. Peter's, Tracadic Cross, Murray River, Summerside and Hunter River. Specimens of potatoes were exhibited showing disease and a description was given of the method of attack, the means by which it spreads, and the remedies to be employed in getting rid of it. A considerable number of the coloured folders on potato diseases were distributed.

A conference was also held with the members of the board of trade at Charlotte-town, at which the question of the embargo on potatoes was discussed.

OTTAWA.

Potato inspection in New Brunswick.—On November 4, 1914, the regulations of the Destructive Insect and Pest Act then in force, were rescinded and revised rules and regulations respecting destructive insect pests and plant diseases were substituted. Under the new form of the Act, the inspection assumed a wider field of action, with a view to the recovery of the United States market. All potatoes consigned from infected areas to the United States, or to disease-free areas in Canada, became subject to inspection, and could not be released for these markets unless certified free from powdery scab, or diseases similar thereto, by a qualified official of the Dominion Department of Agriculture.

Actual work of inspection under the revised regulations commenced in the province of New Brunswick on December 12, 1914. The inspection staff then in the province consisted of eleven inspectors, but shortly after the New Year this number was augmented by six inspectors from Nova Scotia and Quebec.

The immediate call for inspectors came largely from along the line of the C.P.R. running from McAdam Junction to Edmunston through the counties of York, Victoria and Carleton.

The preliminary work of the inspection service consisted in thoroughly acquainting the shippers with the actual working of the rules and regulations, and getting them to comply with them; slight difficulties were met with in this respect, but on the whole it was found that the shippers were anxious to comply with the law.

Method of handling and loading potatoes.—Along the principal lines running through the larger potato-growing counties of the province, the potato buyers have erected at the sidings potato houses for the storing, racking and loading of potatoes; at the smaller sidings, where the amount of trade does not justify the building of a house, potatoes are loaded direct from the wagons or sleighs to the cars. Potatoes are, as a rule, hauled in bulk to the potato houses, there racked, and all diseased, frozen, decayed, or badly injured stock removed, thus making the stock fit for the market. Before the arrival of the inspectors racking and sorting were done in a very slovenly manner in many of the houses. Where loading was done at the sidings, the racking and sorting took place at the farms. In both instances, the sorting and grading of stock were done in the presence of the inspector.

The inspector's duty was to see that disinfection requirements were carried out thoroughly, that all stock leaving his particular district was free from powdery seab, or diseases similar thereto, and otherwise fit for the markets, and that all "first grade" potatoes were, as the name implies, an A1 stock, and from an absolutely disease free source.

Actual experience in inspecting and certifying potatoes soon revealed certain minor faults in the regulations. It was found that many lots of table potatoes were being shipped out of the province, which, although free from powdery scab, showed considerable injury from the digger, or from rot, or frost, and they were so badly sorted as to often render as much as 30 per cent of them unfit for human consumption. It was immediately seen that the government inspector could not possibly "certify" potatoes in such condition. An amendment was made to the definition of table potatoes with the result that their quality rapidly improved. The shippers soon noticed the effects of more careful attention to the quality of potatoes, so much so that they were asking to have their grading made to apply to all potatoes shipped from New Brunswick anywhere.

This year the condition of potatoes was unusual, since probably 40 to 50 per cent of the potatoes harvested in 1914 in this province were marred by cuts or bruises. This feature was due to the fact, that at digging time the ground was very dry and the digging machines carried up little or no soil with the potatoes, when elevating over the carriers. The result of the loss of this protecting soil was, that the potatoes were exposed to the harsh surface of the elevator and in many instances were badly injured or cut.

OTTAWA.

Amount of potatoes inspected.—From December 14, 1914, to March 31, 1915, 80,400 bushels of first grade potatoes and 521,000 bushels of table potatoes have been duly inspected and certified. Of these 53 cars containing 41,123 bushels were shipped to the United States. The United States inspectors then found one car of Canadian potatoes to contain infected tubers with the result that all permits to import potatoes into the United States were cancelled.

Lessons from the inspection.—Notwithstanding careful training and devoted attention to the duties of inspection, it is humanly impossible for any inspector to certify and pass potatoes without allowing an occasional infected potato to pass through. The responsibility rested almost entirely with the inspector, whereas, in our opinion, it is most important that the farmer do his share of the work, and the shipper the rest: The regulations called for the inspection of farmers' crops, which was carried on as far as possible, but, when the shipping became more rapid, the inspectors had to frequently inspect and rack the potatoes, while a car was being loaded.

Furthermore, the fact that the regulations permitted the shipping of uninspected potatoes within the diseased area, resulted directly in the propagation of the disease, which it was considered important to control. The farmers would regard the inspection as a farce, because they could sell all their potatoes, irrespective of disease or inferior quality, to the shipper who shipped within the diseased area, whereas they immediately had to permit the racking and sorting of their potatoes with naturally a loss to themselves, when they dealt with shippers shipping outside the province.

2. PLANT PATHOLOGY.

Every day of the year there were received a number of diseased plant specimens for identification and suggestions for treatment. In a great many instances, the diseases are very common ones and need little attention beyond the giving of the advice sought. In others, the investigation requires several weeks or even months before its definite cause is recognized. In such cases, however, advice may often be given at once, as the general mode of spread and distribution is about the same in a good many diseases, but it is most important to carry on a study of any new or little known disease in order to discover its proper treatment. In nearly five hundred instances advice was given concerning the control of specific diseases as shown by the specimens received.

We may point out that it is very desirable to send samples of seed potatoes to this laboratory for examination before using them for seed. Commencing with sound seed is one of the most important factors in growing disease-free potato crops. We have occasionally found that firms of considerable reputation sell to farmers a class of potatoes for seed purposes which are worse than useless, often harbouring diseases which are most undesirable on any farmer's land. At the present time farmers have no protection when buying their seed potatoes.

The Division's Farmers' Circular No. 4, showing in natural colours a number of potato diseases conveyed by the use of unsound tubers, has been found a very useful publication. This has brought us many complimentary letters and requests for copies from nearly all over the world, some governmental departments considering this method of instruction one of the most useful ever brought to their attention.

Special attention is being paid by the members of the Division to the study and control of potato diseases. We are calling the attention of the growers of this important crop to several diseases in this report, and hope that a thorough knowledge of the potato diseases together with a co-operative effort towards their control will eventually stamp out the more widely prevalent ones. At the present moment very considerable damage is done by the many diseases affecting the potato plant. In some instances we have observed losses amounting from 25 per cent to 50 per cent of the total yield.

DISEASES OF POTATOES.

Common scab.—In order to test the effect of fresh manures of various kinds on the production of common scab, six plots were planted after manuring as follows:—

- A. No Manure;
- B. Fresh pig manure with straw;
- C. Fresh cow manure with sawdust;
- D. Fresh horse manure with straw;
- E. Fresh sheep manure with straw; F. Fresh hen manure with straw.

The variety used was Irish Cobbler, and the potatoes were free from scab when planted. The land had not been previously planted with potatoes, but had borne a crop of turnips the previous year. After the potatoes were raised, they were washed and divided into four groups as follows: No. 1. Free from scab; No. 2. Slightly scabby; No. 3, Moderately scabby; No. 4. Bully attacked by scab. The percentages of these four groups in each plot were as follows:—

	No. 1	No. 2	No. 3	No. 4
No manure	75.1	20.6	$2 \cdot 9$	1.4
Pig		$22 \cdot 5$	$3 \cdot 5$	1.5
Cow	$75 \cdot 7$	$19 \cdot 4$	3.6	1.3
Horse		26.0	$4 \cdot 6$	1.7
Sheep	81.5	15.8	1.8	0.9
Hen	85.8	· 12·8	$1 \cdot 0$	0.4

From this, it appears that fresh horse manure increased the amount of scab considerably more than did any others of the manures used, while the largest amount of clean potatoes occurred where sheep and hen manure were used.

Powdery scab.—A large number of experiments on methods of control of this disease were carried out during the year and interesting results were obtained. It has not been deemed advisable to publish these results until another series of experiments have been carried out during the summer of 1915. An exactly similar set of experiments has been planned for the Central Experimental Farm and four of the Branch Farms in Quebec and the Maritime Provinces, and it is hoped the results throughout will be of a uniform character.

Net necrosis.*—When a potato tuber is cut across, there may be seen a large number of very small spots or areas of a yellowish colour, the rest of the flesh of the potato being of a much whiter hue. These yellowish areas are the "vascular bundles" which correspond in the potato tuber to the veins of a leaf.

During the year a considerable number of potatoes were found on being cut to have brownish internal discolourations which at first are arranged in the form of a ring, but later on become quite irregular in their distribution. These discolourations correspond to the vascular bundles mentioned above.

The disease (if it can be called a disease) begins at the stem end and gradually travels along the vascular bundles towards the eye-end, turning them brown as it proceeds. No fungus or bacterium has been found as the cause of the disease, and it is not communicated from one tuber to another by contact during storage so far as we know at present. It is of wide occurrence, having been reported during the year from New Brunswick and British Columbia. It has been suggested that "net necrosis" is an indication that the variety in which it occurs shows symptoms of deterioration, but as yet there does not seem to be sufficient proof for this statement.

^{*} See illustration Angual Report of Dominion Betanist for the Year 1911, pl. 9, fig. B, and Farmers' Circular No. 4, fig. 2.

Some experiments were undertaken during the year to determine whether tubers that showed "net necrosis" before planting would produce a crop free from the disease, but this hope was not realized, it being found that the disease in almost every case was hereditary. Further experiments will be carried on during next season, but the only remedy that can be suggested at present is to diseard all potatoes that show the brownish discolourations when cut at the stem end, and to use only perfectly sound tubers as sets.

Silver scurf.—Specimens were received during the year from British Columbia badly affected with this disease, so that its occurrence would not seem to be general throughout the Dominion. In the United States, it has recently been found as far west as the State of Utah.

Some experiments were undertaken to test the effect of fungicides in preventing the appearance of this disease, when sets that showed silver scurf were planted. Formalin, copper sulphate, corrosive sublimate, hydrogen peroxide and sulphur were used, but, as the experiments were of a preliminary nature, only small quantities of tubers were used in each case. It would be unsafe to draw any general conclusions from the results obtained, but they look promising and will serve as a basis for a much more extended series of observations next season.

Rhizoctonia or black scurf of potatoes.—(Corticium vagum solani, Burt.)—(Plate 1).—This disease has been mentioned and illustrated in previous reports, but recent knowledge of the presence of the causal fungus in the interior of the stems of the potato plant makes it of greater importance than was previously suspected. The familiar black, scurfy outgrowths on the surface of potatoes are the "selerotia," which constitute a resting stage of the fungus. When tubers showing these sclerotia are planted, the fungus develops, as the potato plant grows, and infects the young shoots, forming brown scars or lesions on them (Fig. C). These may at times completely girdle the stem at about the ground level, and so cut off the food supply going to the leaves as well as that going to the roots for the growth of the new tubers. This disturbance often results in the production of small tubers in the axils of the leaves, as shown in Fig. A, Plate 1; or, when tubers are produced below ground, they are not usually of a marketable size.

The sclerotia previously mentioned have also been found to occur on the roots, as shown in Fig. B. In this way a field producing an infected crop would itself be infected on account of these sclerotia being left in the soil.

Our present knowledge of this disease confines us to two lines of treatment, viz :--

1. Soaking the tubers for three hours in a solution of bichloride of mercury, one ounce in 12½ gallons of water, so killing the sclerotia on the seed potatoes.

2. A strict rotation, in which potatoes would be grown only once in every four or five years in each field, so that those sclerotia left in the field on the roots of infected plants may not be able to infect another crop, which they would do, if potatoes were planted in that field during the few years following the infected crop.

We are now treating generally all our seed potatoes in the way recommended above, and have succeeded—even on a large scale—in reducing the losses from Rhizoetonia considerably. Indeed in some years the potatoes raised on the farm from properly treated seed were almost perfectly clean.

Although at times a potato plant may show plain symptoms of Rhizoctonia infections above ground, viz.:—a curling of the leaves, which are also often lighter given to yellowish in colour—there may be no effect visible below ground beyond a few insignificant stem lesions. But in our experience the tubers produced from a plant of this description are of inferior strain and likely to produce diminished crops when used for seed. For this reason we practice careful removal of affected plants in the field in order to prevent any decrease of future yield.

OTTAWA.

DISEASES DECREASING THE YIELD OF POTATOES.

A potato disease affecting the potato tuber and readily recognizable as a disease, as, for instance, Common Scab, Powdery Scab, Dry Rot, Late Blight, Net Necrosis, Fusarium Wilt, or Silver Scurf, is not considered as dangerous as are a number of diseases which reduce the yield, but show no signs whatever on the "seed tuber." The former may easily be removed when selection of seed tubers is practised, or when cutting the sets for seed. The most important factor for the elimination of diseases of the latter group is the inspection of the growing plants and the systematic removal of all plants showing any of the symptoms of mosaic leaf, leaf roll, curly dwarf, Rhizoctonia, or black leg. Where this method is practised, the crop will be reasonably free from diseases, providing, of course, that late blight is prevented by the usual sprayings.

Black-leg of potatoes (Plate 2).—The accompanying plate illustrates the chief features of the "group" of potato diseases popularly referred to as "black-leg." Several bacterial organisms have been described, of which probably Dr. Harrison's species Bacillus solanisaprus and Dr. Appel's B. phytophthorus are the most common in Canada, if indeed the slight diagnostic differences between the two justify their separation into two species.

The potato "black-leg" disease has been observed practically in all regions of the Dominion where potatoes are being grown. It often causes considerable losses. In one instance of about 300 plants in a row, some 100 had been destroyed by this disease. The proportions were the same all over that particular field, and the loss amounted to practically 33 per cent of the yield.

Appearance of black leg.—Where infected potatoes have been planted, without due precautions, the field will invariably show a considerable number of "misses," resulting from the failure of the planted sets to grow. When digging up the planted set, it is usually a decayed, putrid, rotten tuber, or portion thereof, that is found. The black-leg germ has consumed the set entirely and prevented it from making a growth.

On examining the other plants in such field more closely, we will discover a number that are below the size of the normal plant; they are also yellowish green in colour, and their leaves are curled up, giving the single shoot a compressed appearance. In order to make quite sure of this appearance being due to black-leg, catch hold of one or more vines, pull them up, and look at the portion that came from underneath the ground. If this is black from below ground to about 3 inches to 4 inches up the sten, and either dried up, or slimy and moist, this is one more factor proving it to be black-leg disease. Fig. (b) of our plate shows a young sprout with a typical black "leg."

Fig. (a) shows a whole plant affected with black leg. The shoot in the centre is wholly killed; the other two are affected to some extent above ground and, their base being destroyed, the shoot tumbles on its side, the leaves will curl up and fade, and eventually the whole plant will die.

"Leaf-roll" disease of potatoes (Plate 3).—The importance of removing all hills in a potato field showing any symptom of disease, and thus eliminating all risks of harvesting a diseased strain of potatoes, is emphasized in the case of leaf-roll of potatoes. This disease cannot be detected by an examination of the seed potato, hence, if such are taken from a crop infected by this disease, they are likely to be planted without hesitation, and the result will be a very serious decrease in yield. It is, therefore, important for every farmer to become acquainted with the symptoms of this potato trouble to avoid serious losses in future crops.

The figures of plate 3 will plainly show what a typical hill affected with "leaf-roll" will look like in the field. The normal potato foliage shows the leaves well expanded and fairly flat; perhaps the young undeveloped leaves may show a degree of folding, which, however, is quite normal; but, when a number of plants are found, which are dwarfed and have all their leaves peculiarly rolled up, as plainly shown

in figure (b) of our plate, we have little doubt that a case of typical leaf-roll is under examination. These plants often bear a foliage slightly discoloured, at times of a lighter green, at others of a yellowish tint, or still again rather tending towards a purplish hue.

These symptoms are noticeable at a very early stage of growth and, if such a plant is watched, it will rarely be found to recover its normal appearance. On digging up a plant of this kind, we may find a number of apparently perfect tubers, indeed we have sometimes found an almost normal yield below ground; this is rather an unfortunate condition, for the tubers resulting from such plant contain the disease without showing any signs whatsoever, and are likely to be planted by the unsuspecting farmer.

If such a tuber is planted, the result will be a plant like that shown in fig. (c). This bears not a single marketable potato. At the bottom of the picture, there is shown the sound mother tuber, a few clustered tubers at the base of the stem and the thickened white stolons with small tubers attached, which will never grow to any size.

We have observed a field of potatoes recently which showed some 80 per cent of leaf-roll diseased plants, all of which bore some marketable tubers. If the farmer should plant one acre with these tubers, it would not be worth his while to harvest the crop. It has been shown repeatedly that the leaf-roll disease is transmissible, and that potatoes from a diseased plant will give little or no yield.

In order to avoid such losses, it is most advisable not to use for seed any of the tubers harvested from a field showing more than 5 per cent of affected plants. This may seem severe, but we must bear in mind that, though such crop still shows 95 per cent apparently of sound plants, there is a strong probability that a large proportion of these plants may turn out to be tubers, which, when planted, will grow up into diseased plants.

Where five and less per cent of affected plants occur, they should be removed immediately to prevent the harvesting of diseased tubers.

We consider this disease sufficiently serious to warrant the attention of all potato growers, particularly those growing seed potatoes.

Great care should be taken by potato growing centres in the eastern section of Canada to stamp out this disease; should this warning be disregarded, it may result in serious losses in the trade of seed potatoes.

The cause of leaf-roll is not known. For years the study of the cause has engaged the most experienced potato disease specialists, but no satisfactory solution has yet been reached. It is looked upon as a physiological trouble rather than a parasitic one; it neither spreads in the field from one plant to another, but is exclusively conveyed by using seed potatoes from a diseased crop, nor does it appear to infest the soil.

The term "leaf curl" or "curly dwarf" is often used in describing an appearance

probably related to leaf roll, viz.: When the foliage of potato plants curls up very much, presenting an appearance similar to currant leaves, puckered, curled and clustered through aphid attacks. Sometimes the "curling" is so pronounced as to resemble "Scotch or Curly Kale." Such plants are of dwarfish habit and of so characteristic an appearance, that it is difficult not to recognize a typical case.

Mosaic disease of potatoes. One of the most obscure maladies of certain solanaccous plants, to which group the potato, tomato, and tobacco belong, is the trouble popularly known as "Mosaic Leaf Disease." This has for some years attracted the attention of plant pathologists in Europe and America. Nothing very definite is known of its nature, but since it has proved considerably injurious in tobacco and tomato plants, it is advisable to call attention to its occurrence on the potato.

We have no original contribution to make, at present, to what is already known about this trouble, since it has only come under our observation in Canada for two seasons. We are, however, making a careful study as opportunity affords. At present only a description of its symptoms is being given to enable students and others inter-

ested to recognize it.

Mosaic leaf disease is not recognizable on examining a potato tuber. In tobacco the disease is not considered hereditary. In the tomato this point is still subject to some controversy. In the potato, a plant almost exclusively propagated vegetatively, through its tubers, the disease is, according to our observation, transmitted through tubers harvested from a plant showing symptoms of Mosaic. Some observers record that it is spread by contact, by alternately touching diseased and healthy plants. It is considered an infectious disease. At present we cannot confirm these reports. One fact, however, is worthy of record as far as our observation is concerned. The sound leaf of plants is a complicated "plant" for the manufacture of food. Any impairment in its construction, or deviation from its normal functions, the former of which is recognizable by microscopical examination, whilst the latter is a deduction from such observation, naturally reduces the activity of the leaves as manufacturers of food; hence the potato underground must suffer according to the intensity of the trouble present. This is the actual case. Mosaic disease-infected plants do not consecutively yield normal crops. For this reason, it is advisable to pay heed to its presence and avoid the use for seed of tubers produced by an infected crop.

The following is a description of the disease as we have observed it:-

Mosaic leaf disease manifests itself by producing in the leaves a mottled appearance, which is more or less readily visible. The mottling is due to irregular patches of lighter green to yellowish areas appearing all over the leaf. This discoloration is not very clear in sun light, but, when holding in the shade a leaf of a plant which is suspected of Mosaic disease, and comparing it with that from a sound plant, it will

show up the mottled appearance much more strongly.

The lighter coloured areas, which by no means give one the idea of a "sick" leaf, are slightly thinner than the normal portions of the same leaf. The difference is often so slight as to be perceptible only after microscopic measuring. The leaf may also be puckered, particularly when the disease is in an advanced stage. In the variety "Red Bliss" we have seen the disease worst, but other varieties, like "Cobbler," and "Green Mountain," have also been observed to be infected. Accompanying these symptoms, from which the disease has obtained its name, there may be observed a curious rosette shape formed by the younger leaves. The affected plants are often of normal size, and bear a normal crop, when observed for the first time.

In plants grown from a potato taken from a typical mosaic leaf plant, the leaves show the mottling very plainly, they do not grow very vigorously at first, but may later pick up somewhat in vigour, and yet produce some few good-sized tubers. It is generally after a few years that a decline in yield is observed. There are no constant

symptoms visible externally on any other part of the plant.

When potatoes are raised for seed purposes, the presence of more than 5 per cent of Mosaic disease should disqualify the field altogether. Though the nature of the disease is so little known, the indications are that it may prove a very objectionable trouble, so that it is advisable to take every possible step to prevent its propagation by affected seed potatoes.

CLOVER AND ALFALFA WILT DISEASE.

Clover and alfalfa are among the most useful fodder plants grown in Canada, and any disease likely to prove destructive to these crops should be speedily recognized and prevented from doing serious damage. Generally speaking, Canada is fairly free from clover diseases. The alfalfa leaf spot, which occasionally may result in severe losses of herbage, occurs now and then, but, though widely prevalent, cannot be said to be a very serious disease.

It is different with the clover and alfalfa wilt, should it become in this country anything like as serious as it has proven itself to be in the old world.

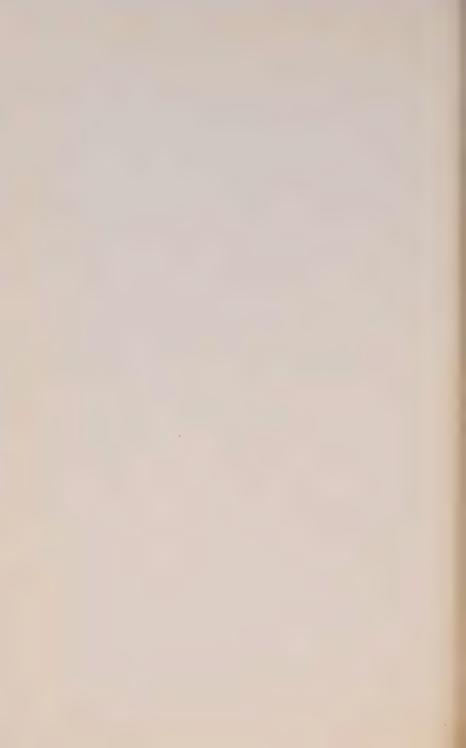
OTTAWA.



A. The parts above ground of a potato showing axillary or aerial tubers common in Rhizoctonia disease.

B. Portions of roots showing dark-coloured sclerotia of the fungus.

C. Portion of the stem of potato below ground, showing the dark spots or lesions caused by the fungus.



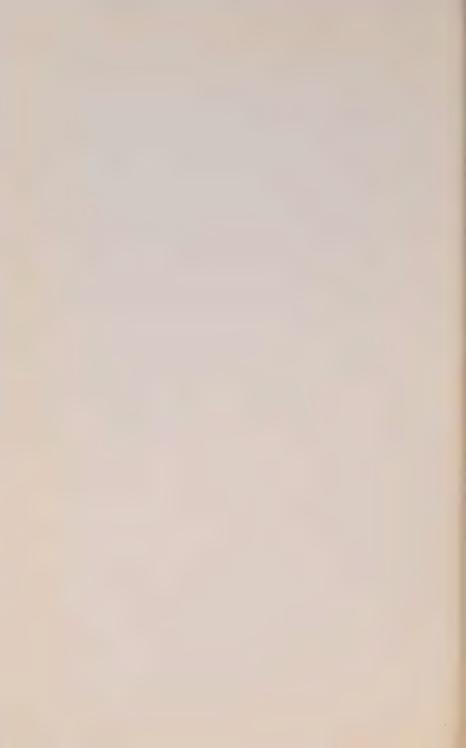


(Photo through the courtesy of Dr. W. A. Orton, U.S.A. Dep. of Agric.)

A. A potato plant dying from an attack of Black-leg.

B. A young potato shoot showing the typical "black-leg" or killed portion of the stem below ground.

C.—F. A number of tubers showing black-leg infections.



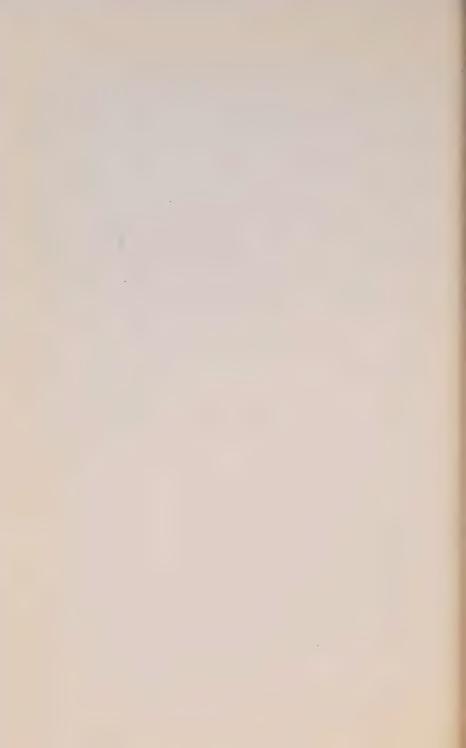


(Photo through the courtesy of Dr. W. A Orton, U.S.A. Dep. of Agric.) Leaf Roll Disease of Potatoes.

A. Two potato plants showing typical rolling up of leaves.

B. This plant shows the leaf roll disease very plainly.

C. Underground portion of a petato plant affected with leaf roll. Note the parent tuber planted, at bottem, which has not been consumed and the few clustered tubers towards the crown. No marketable tubers in this case.



While writing these lines, we have only observed two authentic cases of this disease. One was reported to us from the experimental plots of the Agricultural College at St. Anne's, Que., and the other appeared in a small plot on the Central Experimental Farm. In both cases the damage to the crop was negligible. An examination of clover fields in other sections of the country will be made, and until this has been completed, nothing further can be said about its present distribution.

In the United States, this disease, or one apparently identical from the records, appears to have been known since 1889 when it was first recorded from Delaware. Prof. Stewart of Geneva, N.Y., records a wilt of alfalfa observed in 1899; from his description and plate it appears the same as that under our consideration. The same is the case with a disease on alfalfa recorded by Prof. Jackson of Oregon. It is evident from the existing accounts that the disease has not shown itself very destructive so far in America.

In Europe, particularly in England, clover lays are frequently destroyed in an slarming manner. It is generally held that such land has become "clover sick," by which is meant that it cannot grow any more clover once a clover crop has failed. This condition is considered by the agricultural chemists of that country to be due to some changes "within the range of the root" indicating some chemical deficiency, or change of the soil detrimental to the growth of clover. Even though it has been shown that the trouble is due to a fungus disease, the particular disease mentioned above, the chemical experts still view the matter from the chemical point of view rather than the biological.*

Appearance of clover or alfalfa wilt .- After winter, when these leguminous plants would normally start into growth by sending up fresh new shoots from the underground rootstocks, there may be observed in the field larger or smaller patches which remain bare. It is not infrequently given as an explanation that "the clover on these patches has been winter-killed." It is, however, peculiar that a number of plants in certain small patches only should be killed by the winter, while the rest start vigorously into leaf. In some instances, no doubt, such appearance may be caused by the plants having been killed by frost or ice, particularly when, for some reason or other, the snow covering was insufficient or wholly missing, but a careful examination of the clover plants early in the season will invariably reveal the true cause. We have observed a number of bare patches in our small plot, and being familiar with the appearance of clover wilt, hunted for evidences of same. The plants growing in the neighbourhood of the bare patches were carefully examined and a number of wilting plants were found. These had made (about the middle of May) a growth of some four to five inches and the shoots looked sickly and limp, as they might appear after a severe drought. The leaves had turned a darker green than shown in sound plants, and the bottom leaves were shrivelled, brown in colour, and quite dead. The plants were dug up and examined carefully. From this preliminary examination, we were fairly certain that it was a case of clover wilt. Microscopical examination, while on the whole giving us additional clues, did not absolutely confirm our opinion, inasmuch as the tap root of the clover was found to be attacked by the Clover Root Borer (Hylastinus obscurus). Diseased tissue was cut out which showed plenty of mycelium of a fungus and was placed on a nutrient substance. This method resulted in absolute proof of the identify of the disease with our knowledge of clover wilt as causing clover sickness in England. Typical sclerotia developed which were identical with those obtained from the diseased material from St. Anne's, Que.

Farmers are, therefore, requested to look for the "patches" in clover or alfalfa fields and immediately to send in suspicious looking plants showing the symptoms described.

^{*} H. T. Gissow, Clover Sickness and its cause, Journ. Roy. Agric. Soc. of England, Vol. 64 entire series, pp. 376-321.

Cause of clover wilt.—The clover wilt is caused by a microscopic fungus, known to us by the scientific name Sclerotinia ciborioides. Other investigators refer to it as Sclerotinia trifoliorum but this is a matter of botanical nomenclature. Those who consider the fungus as identical with Sclerolinia libertiana Fckl. have no doubt their In cross inoculations made in this laboratory, we readily produced the typical soft rot caused by S. libertiana by using sclerotia of that fungus produced in pure culture for inoculating carrots, while in no case did we succeed in doing this with pure culture material of the fungus isolated from clover. When examining clover or alfalfa plants killed by this disease, the most striking and characteristic feature is the presence of a number of black bodies of a horny substance varying in size from the head of a pin to a wheat grain. These black bodies in clover appear more or less deeply embedded in the tissues of the crown of the root or in the tap root itself. In alfalfa they may also appear inside the split stalk, as well as on the outside of same. The botanists call these bodies sclerotia and consider them specially organized masses of fungus mycelium, which serve the purpose of reproducing the same. The clover wilt fungus produces an abundance of mycelium, which penetrates the tissue of the plants and envelopes the crown, stem and leaves with a dense growth. From this growth the sclerotia are eventually produced and, when full size, drop to the ground where they hibernate. In spring, these sclerotia produce a fruiting stage consisting of one or more stalked cup-shaped receptacles, furnished with a layer of minute spore sacs, bearing reproductive spores. These spores are then shot out of the sacs and germinate on the clover plants, where they continue to grow and finally, towards the end of the season or throughout the season, again produce sclerotia.

These sclerotia remain alive in the soil, which they closely resemble, for a considerable period. Sometimes such large numbers of sclerotia accumulate in the soil as to prevent any clover from growing; this factor has led to the belief of the land having become clover sick. This is not the case, because on removing nine inches of the top soil of a small plot showing all characteristics of "clover sickness" and picking out of it an enormous number of sclerotia—and returning the same soil again

to the plot, a beautiful even stand of clover was obtained at once.

In agricultural practice, the removal of the sclerolia is impossible. Their destruction in the soil is likely to be equally impracticable. This disease again points out the absolute necessity of practising rotation of crops. There are two possible means of eradication: (1) Spraying of clover fields with some fungicide, just as the spraying of potatoes is practised, or (2) the selection and breeding of resistant strains,

both of alfalfa and clover.

Much research is still required before more definite information as to the control of this disease can be given. When the disease is noticed in a field, the sooner in spring the dead patches are taken up for a depth of about six inches the better. They should be filled in with new soil and may be resown with clover. The soil removed, which most likely contains a large number of sclerotia, should not be conveyed to any place whence it may find its way eventually back to the land and distribute the disease. It might be spread in the centre of a road actively in use by traffic.

3. ECONOMIC BOTANY.

A large number of weeds and other plants for identification were received during the year. More than half of these were sent in during the months of July, August and September, but some specimens were received during each month of the year.

The following table shows the number of specimens sent in for examination from

each province of the Dominion:-

Nova Scotia	22
New Brunswick	57
Prince Edward Island	156
Quebec	198
Ontario	182
Manitoba	41
Saskatchewan	121
British Columbia	112
2	00

These with a few specimens from unknown localities give a total of 955 reported on during the year.

IDENTIFICATION OF PLANTS.

A number of the above specimens were plants that were suspected of poisoning cattle and horses. In many cases, however, the plant sent was dug up by the farmer from the field where his cattle were grazing and was not a poisonous plant. It may be desirable to point out here that the only satisfactory way of establishing cases of poisoning by plants is to open the stomach of an animal that has died and remove any vegetable matter and soak it in 20 per cent formalin for two hours. This acts as a disinfectant and serves to remove any offensive smell. It should then be taken out of the formalin and allowed to drain for a few minutes, wrapped in a piece of cloth, and sent in a tin box to Ottawa for examination.

As might be expected, a considerable number of plants sent in were weeds of cultivated land and were accompanied by a request for the easiest method of cradicating them. But in addition to weeds, specimens were also received of various native shrubs and trees, and wild fruits, indicating a widespread interest in the native vegetation of Canada. Probably the largest consignments of specimens were from school teachers and were collected in the locality where the school was situated. There is no doubt whatever but that this is a kind of work deserving every encouragement. Instruction of the rising generation in the names and habits of common weeds and native plants generally will not only add to their interest in country life afterwards, but will enable them to carry out farming operations with more success and intelligence.

In this connection a few useful hints on the sending of plants for identification may be useful. Frequently we receive plants which are so dried up and brittle, with the leaves shrivelled or matted together, that they have to be soaked out before examination, and consequently much time is lost. It sometimes happens that the plant reaches us in the form of powdered fragments and is, of course, unrecognizable. Sometimes we receive a few inches of the root only, or a single leaf, or fruit, and we are expected to name the plant from a mere fragment. In some cases this is possible, but as a rule it is very difficult.

1. Wild plants only or weeds should be sent. Garden flowers, cereals, seeds, etc., should be sent to their proper departments.

2. All plants sent for identification should, if possible, be in flower or fruit. The underground parts as well as the lower leaves should in all cases be sent.

3. Fresh specimens can usually be identified much more quickly than dried specimens. They should be sent in a tin box. If a wooden box is employed, the specimens should be wrapped in damp moss or blotting paper.

4. Dried specimens should have the leaves carefully flattened out and should be sent between sheets of stout cardboard. This is necessary to keep them from crumbling to pieces, as they are very brittle when fully dry. Specimens may be dried by laying them between sheets of blotting paper and spreading them out flat, placing a weight on top and changing the paper several times until they are dry. The flowers of dried plants have frequently to be soaked in water, and hence their identification is much more tedious.

5. Each specimen should have a number attached to it and the sender should keep a similarly numbered set for reference. As a general rule, specimens are not returned.

Several specimens of each plant should be sent.

6. It will greatly facilitate the work of identification if a short note is added, stating where each species was found growing, whether in a wood, marsh, cultivated

ground, etc.

7. Large collections of dried plants should be sent for examination during the winter months. As large numbers of plants, especially weeds, are sent for examination in early summer with a request for methods of eradication, these have to be attended to at once. Large collections, as a rule, have to wait for a more convenient season.

8. The name and full address of the sender should be written clearly on the

outside of the package or on a slip placed inside.

9. Letters and packages addressed to the Dominion Botanist, Ottawa, if under 12 ounces, are carried free. There is no limit to the number of packages that may be sent but each must be under 12 ounces.

In addition to specimens being sent up, many requests for information on various subjects were received. A large number of these had reference to the profitable cultivation of medicinal plants. At present, owing to the European war, the price of certain plant drugs is unusually high and some farmers have the idea that larger profits are to be obtained by growing these than can be made from the cultivation of the regular crops. In order to meet these requests for information, a bulletin has been prepared on the subject, and is at present in the press.

Other questions of a miscellaneous nature have been the subject of correspondence during the year, such as the profitable cultivation of hemp in Canada, the growth of the mulberry for silkworms, the culture of wild rice in marshy land, and various

other topics.

Seeds were received in exchange from the following Botanic Gardens: Brooklyn, U.S.A.; Siena, Italy; Yurjew, Russia; Sydney, New South Wales, Australia; La Mortola, Ventimiglia, Italy; and the Botanical Gardens, Trinity College, Dublin, Ireland. Seeds were sent out to the following: 37 packets to Sydney, N.S.W., Australia; 70 packets to Manitoba Agricultural College, Winnipeg, Man.; 77 packets to Royal Horticultural Society's Gardens at Wisley, Surrey, England; 15 packets to West Kensington, England; and 16 packets to Royal Botanic Gardens, Glasnevin, Dublin, Ireland.

My assistant Miss Fyles was directed to take charge of the preparation of an exhibit on weeds. For this purpose, sixty-one species of weed seeds, kindly supplied by the Seed Commissioner, Ottawa, were sown May 27 and 28, 1914, in pots and experimental plots at the Central Experimental Farm, for the purpose of studying the early stages of growth of the most common as well as the most harmful weeds in Canada. Specimens of each species were pressed at every important change in the development of the weeds throughout the season. The knowledge of weeds in a young state is highly important to the agriculturist, as it is at this period of growth that they may be most readily and easily controlled.

On July 11, Miss Fyles left for a tour through the West in order to collect flowering specimens of the Western weeds as they are found in their natural surround-

ings. Treesbank, Brandon, Indian Head, Medicine Hat, Lethbridge. Agassiz, Victoria, Lacombe and Rosthern were visited as collecting centres, from which trips were made through the neighbouring districts. Upwards of 800 perfect specimens of weeds representing 44 different species were collected, pressed, dried and shipped to Ottawa, during July and August. Many hundreds of botanical specimens other than weeds were also collected, as opportunity occurred, to be included in the Herbarium. During this trip, it was repeatedly observed that weeds of the worst kinds were allowed to reach maturity on the roadsides and waste places in all directions. This negligence is in a large measure responsible for the constant presence of weeds in cultivated fields.

A demonstration of the life history of 22 different species of Western weeds was prepared for the Central Experimental Farm Western Exhibition circles, each circle showing 14 different species. Each specimen is placed on cotton batting in a shallow cardboard box and covered with glass, which makes a very useful exhibition case.

Exhibition Circular No. 45 was written and 75,000 copies published to accompany this exhibit. The attention of the general public was also drawn to this novel method of mounting weeds by an article in the "Agricultural Gazette."

4. REPORT FROM THE FIELD LABORATORY AT ST. CATHARINES

By W. A. McCubbin, M.A., in Charge.

During the year of 1914, the work of this laboratory has been carried on with increasing success, following out the policy laid down at its inception in 1912, which policy embraced three main features: A general oversight of the district to watch for new diseases and to note the progress of those already present; identification of diseases and advice regarding treatment; experimental work on diseases, which are in need of investigation.

The observations and experimental results which follow partially record the work of the year, but much of the work, including several of the more important investigations, is still incomplete, and it is desirable to defer any account of these till they are finished. A number of minor observations and notes on diseases of less general interest

are also omitted.

Owing to the frequent dependence of the spread and virulence of diseases on weather conditions, it was decided early in the year to keep a daily weather record which would contain data valuable to the pathologist, such as the maximum and minimum temperature, periods of drought and rainfall, prevailing winds, etc. The records so far kept have proved useful in so many cases that an effort will be made to make these records more complete and comprehensive than has heretofore been possible.

During the year a large number of specimens have been added to the collection of local diseases and a great many photographs have been made of typical specimens of these. From many of these photographs lantern slides have been prepared, and they have also been of use in supplying illustrations for a bulletin on fruit tree diseases begun in 1913 and completed during the present year (Central Experimental Farm,

Second Series Bulletin No. 24).

The universal lack of an adequate general knowledge of the nature of diseases and of the fungi which cause them has become more and more apparent, and an effort has been made this year to partially supply the need by giving addresses whenever possible on the "Principles of plant disease." The matter of these addresses was carefully prepared so as to present the subject in a simple manner and use was made of a series of lantern slides specially made up for the purpose. Twenty-two addresses of this nature were given during the winter and the interest shown in them has been so encouraging that they will be continued and extended during the coming year.

IMPORTANT DISEASES DURING THE YEAR 1914.

APPLE.

Irregular apples.—The ordinary occurrence of small, bunched, mis-shapen apples is well known to be due to the attacks of aphis during the early period of growth, and these have been met with quite frequently all over the country. During the recent summer, however, there came under the writer's notice a form of irregularity that differs much from the ordinary sort and seems to be due to an entirely different cause. The apples in this case were confined to two trees (Greening) in the orchard, which was large, well cultivated, sprayed and pruned. Practically all the apples on these trees were affected and the trouble recurred on these trees year after year. The larger apples

were deeply lobed and fissures extended from stem to calyx, so as to almost divide the fruit into several parts. The smaller apples had these lobes less clearly marked, and had more of a lumpy appearance (see Fig. 5, Plate 4). An examination of the internal structure brought out two facts; first, that there were present an abnormal number of seed cavities; and second, a very imperfect union of the calyx with the gynoecium. In some, a cavity between these two parts could be seen, which extended fully half way around the fruit. In this cavity, there often occurred a white proliferation of the fruit tissue, which consisted of stringy or finger-like growths. Many of the seeds were abortive, especially in the smaller fruits, and the seed cavities were for the most part six in number. It is probable that there is here a physiological derangement of the tree rather than any result of the work of a parasite.

CHERRY.

"Blighting" of cherry shoots.—During the month of July, a number of vigorous, young, sweet cherry trees were observed to have numerous short shoots dying along the main stem and larger branches. The leaves on these shoots died suddenly in a manner suggesting Pear blight. It was found on examination, however, that the longitudinal growth of these shoots was not keeping pace with the wood growth of the stem, so that, when they were carried outwards by the radial increase in stem wood, their vascular connection was torn away from the trunk when, of course, they wilted and died.

Shelf fungus on cherry trunk (Fomes applanatus (Pers.) Wallr.)—During the summer of 1914, a dying, sweet cherry tree (Elkhorn) near St. Catharines was found to be suffering from an attack of this fungus at the base of the trunk. There were no wounds evident, but it is highly probable that the fungus obtained a footing in a winter-killed area. As will be seen by the plate (Figs. 37, 38), there is a distinct irregularity near the base where the union took place between the bud and the Malaheb stock, and such irregular or imperfect unions are frequently found to be subject to collar rot. At the time of examination, one half the tree was dead and the foliage on the other part was small and sickly. On cutting down the tree, the white strands of the fungus were found in the wood about this region and extending into the roots. A section of the tree was placed on a tub of moist earth and one of the knob-like growths developed later into a typical shelf, which J. H. White of Toronto University kindly identified as Fomes applanatus (Pers.) Wallr.

It is noteworthy that several other trees adjacent to this one have become infested, and may be expected to live but a short time, for once the fungus becomes established in the trunk, there is no means of stopping its progress. In this case as well as in a large number of others, where orchard trees are attacked by this and similar shelf fungi, the only thing that can be done is to prevent the fungus from getting a foothold in the tree. Infection takes place either by spores, which are produced by the shelf growth, or by the filamentous growth of the fungus in the soil, principally on bits of wood and vegetable matter contained therein. As the fungus must necessarily enter the tree through a wound or crack of some kind, it is advisable, especially in an orchard where damage from this cause has already taken place, to make as few wounds as possible on the trunk and large roots, or to protect such wounds as are necessary, or unavoidable, by a coat of paint as soon as they are made. It is also bad policy to allow the shelf growths to mature either on the trees or on stumps about the orchard, since the spores produced on the shelf at maturity are a very efficient means of spreading the fungus to other trees.

Trunk injury on cherry.—A striking effect of winter injury on sour cherry trunks is illustrated in Figs. 31, 32, Plate 9. Similar but less pronounced examples of this

trouble have been met with in various parts of Ontario, but, in this particular orchard, the damage was quite marked and about fifty per cent of the trees were affected. The cause of the injury may be stated as follows:—

During the severe winter of 1913-14, the cambial or growing region under the bark of the trunk was so severely injured that the bark and the growing layer beneath it were loosened or separated from the main part of the trunk by the death of the tissue just beneath. Ordinarily, when such an injury occurs, enough of the growing layer still remains alive to continue growth and a new layer of wood is added all over the trunk, so that in the years to come the only indication of the injury to be seen is the browning of the heart wood within the trunk. In the present case, however, another factor appeared, viz., a frost crack on one side of the trunk. This crack allowed the loosened but still living outer tissue under the bark to curl outward from the crack on each side, so that, during the following summer, the growth on this side of the stem formed two leaf-like projecting ridges.

CURRANT.

Drooping of currant canes.—In August, 1912, the writer's attention was called by Mr. II. T. Güssow, the Dominion Botanist, to a field of Wilder currants near St. Catharines, in which a considerable number of the bushes showed a drooping of the canes. (See Fig. 25). This field was kept under observation during the succeeding summer, in order to ascertain, if possible, what factor or factors were concerned in causing this drooping.

On June 11, 1913, when the new growth was 6-10 inches long, a large number of the canes were seen to be wilting. (Plate 8, Figs. 26, 27.) In every case there was evident at the bend a blackened area which was usually in the cortex, but sometimes the cells of the pith were affected as well. The bend was not at the soft growing end of the shoot, as might be expected if it were due to lack of water, but occurred about two inches from the base of the new growth. It was suspected at the time that the darkened areas might be due to some parasite, so cultures of the darkened tissue were made under careful antiseptic conditions. Five test-tubes of potato agar were inoculated with this tissue and two poured plates made of the same material all Irom different shoots. All remained perfectly sterile. Moreover, sections were cut very thin and examined for fungus filaments or bacteria, but no trace of either could be found in any of the numerous transverse or longitudinal sections made. A comparison of transverse sections from the bend of the shoot with those made from the same shoot higher up, after staining with phloroglucin, showed that while a considerable secondary thickening had taken place in the latter, the wood cells at the bend had developed little or none. In addition, the actual amount of woody tissue at the bent portion was little more than half that produced in the higher unaffected part of the shoot.

The later behaviour of these shoots was followed throughout the growing season, and it was found that some of them, about 1 per cent, withered and died, without, however, showing evidence at any time of the presence of parasitic organisms. Those which survived went on growing throughout the summer, the end drooped under geotropic stimulus turning upwards again, so that the final appearance of the affected shoot resembled the letter "S" turned on its side. Fig. 28, Plate 8, is a photograph of this condition at the end of the summer, and it will be noted that in the upper figure the growth of the previous year also shows the same drooping.

Associated with this wilt of the canes, there occurred a striking chlorotic condition of the leaves shown in Fig. 29. This chlorosis, as may be seen from the photographs, occurs in patches, but with a strong tendency to follow the veins. It appeared very early on the leaves and was very prominent at the time the leaves first reached

their full expansion. After that no further development took place, and these leaves remained otherwise normal throughout the summer except that a few of those low on the shoots fell early. The chlorotic condition mentioned occurred on a few upright shoots, but was mostly confined to those which had wilted in the manner just described. Bushes on which wilting did not occur had little or none of it.

Less than one-quarter of the bushes in this field were affected, and on the worst cases the trouble appeared year after year. It was quite bad in 1913, and a number of bushes, which had not been previously affected, showed this year pronounced wilting, and the accompanying chlorotic condition of the leaves. Those plants which are subject to the trouble are clearly less vigorous than others which are free, but aside from this feature and the consequent lessening of the crop, no other functional derangements were observed.

During the fall of 1913, a number of the wilted canes were again examined, and it was found that in nearly every case there existed in the pith at the bend, several brown, dead areas of varying size, entirely disconnected and unevenly distributed along the shoot. In the wilted canes of the preceding year these brown areas were not observed, and there was now no sign in the wilted shoots of last year of their having been present. The photograph of a wilted cane split longitudinally (Fig. 30, Plate 8) shows a typical specimen where four brown pith masses are to be seen—two large ones and two small ones. There was no external indication at this time of parasitic fungi, nor did microscopic examination of the brown areas show evidence of any organism, therein. Eleven test tubes of various nutrient media were inoculated with tissue taken from the centre of these brown masses, each from a different mass. They remained perfectly sterile, however, with one exception, which developed a pink bacterial colony, evidently an impurity from the air.

The probability that no parasitic organism is concerned in this drooping of the young growth is strengthened by the fact that it occurs only on the Wilder variety, and that cuttings from these plants also show the same trouble. The only other cases (two in number) observed by the writer are fields grown from cuttings taken from this affected field. Mr. W. T. Macoun, Dominion Horticulturist, does not remember out of his wide experience with bush fruits, any case of the kind on Wilder currents, though he thinks something like it occurs on the Fay. I am informed, however, by Mr. Richard Wellington of the Minnesota Agricultural Experiment Station that he has several times met with this peculiarity on the Wilder currant, but that no parasite had been connected with it.

The probability is that this is another case of varietal weakness. Whether it can be eliminated from the strains or otherwise controlled will require future experiments to determine.

The Current Polyporus (Pyropolyporus ribis (Schum.) Murrill).

References:-

Saccardo—Sylloge Fungorum, Vol. 6, p. 184. Tubeuf & Smith—Diseases of Plants, 1894, p. 452. Engler & Prantl—Die Natürlichen Pflanzenfamilien I, 1**, p. 161. Bull. Torrey Bot. Club—30: 118 (1903). North American Flora—Vol. 9, p. 108 (1908).

The information, that may be gleaned from the above authorities and others concerning this fungue, while valuable from a systematic point of view, is scarcely sufficient for the needs of a practical plant pathologist. Descriptions of the fungus are given by most of these authors; it is recorded as occurring commonly on the genus Ribes, but also on the rose, snowherry and other plants; the suggestion is made that in all probability P. Lonicerae Weinm, and P. Euonymi Kalehbr, are but forms of this

fungus; and numerous localities are mentioned in both Europe and America where it has been collected.

Little has been recorded concerning the nature and extent of its parasitism or the amount of damage it causes, and no means have been suggested for destroying it or preventing its attacks. The remarks which follow are put forward in the hope that they may add something at least to this neglected side of the subject.

In August 1912, the Dominion Botanist, Mr. H. T. Güssow, called the attention of the writer to a field of currants near St. Catharines, Ont., which was affected by this fungus (Fig. 18, Plate 7) and in the intervals of other work a number of experi-

ments and observations were made during the following year.

The field consisted of about a thousand bushes made up as follows: One row of cherry currants, eleven of currants of the Wilder variety, two more rows of cherry currants, and finally several rows of young gooseberries. On examining the field, two facts stood out conspicuously. First, the Wilder currant was the only variety affected, neither the gooseberries, the black currants, nor the cherry currants being attacked in any degree whatever; and secondly, none of the young Wilder plants suffered, but the trouble was confined to the old bushes of this variety. On making a survey of the old Wilder bushes, it was found that out of 550 plants 170, or approximately 33 per cent, bore growths of the fungus. It is probable that the infection percentage was somewhat larger than this on account of the impossibility of including those plants where only subterranean growth occurred.

The bushes in the affected rows were set out seven years ago, but the disease has only been noticed by the owner during the last three years. Since first observed, it has been getting worse each year. So far as can be ascertained, it is the only case of its kind in the neighbourhood, and it is difficult to account for its introduction unless through infection accidentally brought in from some of the less usual hosts in the neighbourhood. None of the plants in the vicinity likely to bear this parasite showed any signs of the fungus whatever, and the source of the infection remains as yet uncertain. On the chance that it might have been introduced with the nursery stock, the plants were traced and the nurseryman written to. He states that he has never seen the fungus among his plants and is quite sure it is not in his neighbour-

hood.

According to our observations, the fungus only grows on the currant for a distance of six inches or so above the ground and may also grow on roots in the soil to a depth of four inches. All the evidence at hand seems to indicate that the fungus is a wound parasite only, and gains its entrance by way of stubs left in pruning, wounds made by cultivating tools, or the ends of roots broken by the plough. non-occurrence on the young plants, as mentioned by several writers and confirmed by observation here, is no doubt due to the absence of a wound of entry on young unpruned bushes. In the many cases examined, the injury by which entry had been effected could clearly be made out, although it was often necessary to cut the sporophore to pieces to determine this point. Location of the wound was made easy by the fact that the tissues of the fungus invariably radiated from this wound. In only a few cases where sporophores occurred clear of the ground did they conform to the typical shape as given in the descriptions. For the most part they consisted of lumpy masses with little or no poriferous surface (Figs. 22, 24, Plate 7). Where these masses form on broken roots below the soil, they are very diffuse and much mixed with earth. Strands can be traced from these subterranean growths out into the soil on all sides. and the manner in which the fungus masses thus gradually intermingle with the earth suggests that a good deal of nourishment must be obtained from dead vegetable matter in the soil. This indication of saprophytic tendencies becomes significant when the relation of the fungus to its host is further considered.

The condition of the various affected plants shows that, for the field in question at least, the injuries brought about by the fungus are not very severe. Several of the largest and thriftiest plants, of which one case is shown in Fig. 18, Plate 7, bore

large masses of the fungus about their bases, and these have been present several years without appreciable effect on their host. None of the plants were killed either wholly or in part, and even a general comparison of plants throughout the field failed to reveal any noticeable difference in growth or bearing between those which were affected and those which were free.

As previously mentioned, the fungus is always associated with wounds, and in all of the many cases examined this wound was found to be healing over normally. The callus, though sometimes slightly distorted by the pressure of the tissue of the sporophore, appeared to be healthy, and the dead tissue was not abnormal in amount. It was apparent that in none of these cases could the Polyporus bring about progressive death or cankering of the tissues to its host, but was quite restricted to the dead portions of the wound.

That the fungus is unable to invade the living parts of its host is shown further by several other features. Cases of recovery were met with where the fungus had died out apparently after having exhausted the resources of dead tissue in a wound; where the wound was above ground isolated from other sources of food supply the sporophore was invariably small in size, or as one might put it, the size of the sporophore was proportional to the dead wood present and not to the size of the stem; the ends of broken roots were often found imbedded in large growths of the fungus, but when cut open the root showed a normal callus and an absurdly small amount of dead tissue at the end; moreover, in sections made of such roots and of the dead tissues about wounds, no mycelial filaments could be seen in any living tissue although such filaments were quite plentiful and evident in the dead parts. All evidence, therefore, goes to show that the parasite is unable to attack the living host. On the other hand, its constant association with wounds seems to indicate that a contribution of some kind must be made by the host and certain features point to the tapping of the sap stream as the advantage derived by the parasite. The texture of the sporophore is such that it absorbs water easily and evaporates it readily, while it differs from most other shelf fungi in requiring a considerable amount of moisture for growth. During the damp season of 1912, vigorous growth took place, while in the summer of 1913, which was very dry, the amount of new tissue produced was very small; hence the probable value of the sap supply as a source of water if not of other substances desirable as food.

Spore cultures were obtained from spores shed from a piece of sporophore inverted over potato agar in a moist chamber for a few hours. The cultures grew well on this medium but very slowly, requiring four or five months to cover the slant surface of an agar tube with its low growing mat of tough light-brown filaments. On peach juice agar and agar made from rat dung, the growth was still slower and the cultures seldom exceeded 1½ centimetres in diameter before the agar dried out. On bean agar, bean pods and carrot plugs the growth was more rapid and more diffuse. Nothing but myce-

From the rubbery or cork-like texture of the sporophores, it was suspected that they might have a constricting action on the stems which they surrounded (Figs. 20, 21, Plate 7) so as to interfere with the conducting functions. That there was a definite shrinkage of the sporophore tissue on drying out was easily ascertained by comparing measurements of cubical portions in the moist condition and after they had dried. It was found that the lineal dimensions decreased on drying by about 8 per cent, and consequently there was a volume shrinkage of about 22 per cent. On wetting these pieces, they regained their former dimensions. As the tissue of the sporophore is very tough and elastic, the shrinkage on drying would necessarily bring about a considerable pressure on those stems which pass through the mass of the sporophore, a condition of affairs which is of common occurrence as will be seen by a glance at Fig. 21. By way of demonstrating the actual existence of such a pressure, two freshly collected sporophores were perforsted by a cork borer and a cylinder of sealing was of exactly the samdiameter as the hole was inserted in each, leaving an inch or so projecting. One was

kept moist and the other allowed to dry, both at room temperature. In the former, the cylinder was not constricted, but the squeezing effect of the fungus on drying out is unmistakably depicted in the accompanying photograph of the other plug after its removal. (See Plate 7.)

While the effects of this constricting action could be clearly seen on a large number of shoots which passed through sporophores, it was in no case very pronounced, and it is probable that these stems are able to adjust themselves to the pressure so that little interference with their conducting processes results. In all cases the growth above the sporophores was normal and no indications of injury from this source were to be noted.

In the hope of discovering some simple and effective means of ridding the field of the fungus, several substances which it was thought might have the requisite fungicidal properties were tested. The methods used and the results obtained are as follows:—

- 1. Formalin, 2 per cent.—Pieces of coarse sacking were dipped in a pailful of the solution and then wrapped around the bases of the plants. A light covering of earth was added to keep in the fumes. After a week or ten days the sacking was removed, and the fungus was dead on all the thirteen plants so treated. Many of them were already being attacked by Penicillium and other mould fungi.
- 2. Ashes.—A shovelful of unleached hardwood ashes was placed around the base covering the fungus thoroughly, and, as before, a light covering of earth was put on to prevent the ashes from blowing away. Four plants were so treated, and the fungus was killed in each case.
- 3. Salt.—Three plants were treated by sprinkling a handful of common salt on the growths and on the ground close to the stem. The fungus was successfully killed in each case.
- 4. Corrosive sublimate, 1 in 2,000.—A pint of this solution was used on two plants. The fungus was killed on one but survived on the other. The failure of this powerful fungicide in this case may be due to imperfect absorption.
- 5. Copper sulphate.—Twenty grams placed where its gradual solution by rain, etc., would act on the affected plants has also killed the polyporus growth in the four plants under treatment.
- 6. Lime.—Fresh unslaked lime liberally applied at the base of the plants and on the fungus growths was used without success. The fungus is still alive on the four plants so treated.
- 7. Sulphur.—Ordinary powdered sulphur at the rate of 20 grams per plant was also used without success. It is possible that in this case better results would have been obtained had treatment been given in the heat of summer when it would volatilize sufficiently to have some effect.

In all these cases, the treatments were given in September and the final examinations made early in November so that ample time was allowed for recovery of the parasites, since throughout this period the fungus was growing well on the untreated plants in the field. It was intended to continue these experiments during the summer of 1913, but there was such a scanty and uncertain growth of the fungus owing to the dry weather that further work was deferred till another season.

Summary.

- 1. Pyropolyporus ribis occurred here only on the Wilder currant and only on the older plants of this variety.
 - 2. In the field under observation no serious damage can be attributed to it.

3. It is a wound parasite which apparently cannot attack the living tissue of its host or even extend the wounds in which it occurs. It apparently obtains only sap from its living host.

4. Of the several substances tried as remedies, formalin. copper sulphate, common salt and ashes gave promising results in the preliminary experiments, while corrosive

sublimate, lime and sulphur were unsatisfactory.

GRAPE

Chlorosis of grapes.—Although cases of Chlorosis or yellowing of grape foliage are to be found throughout the district, they are not at all numerous ordinarily in any one vineyard.

The chlorotic condition may result from:-

1. Fusicoccum viticolum, which is responsible for perhaps 50 per cent of the cases, or even more.

2. Poor soil, lack of nourishment. In this case, all the vines are more or less unhealthy but a few of the weaker ones may show pronounced chlorotic conditions.

A particular case of (2) deserves mention. Grapes are often grown on the edges of the ravines, which cut through the level alluvial deposit lying below the escarpment. On the level ground above the ravine and on the richer soil below, the vines are healthy, but just near the brow of the slope where the subsoil is nearest the surface and where leaching is most rapid, cases of yellowing are often met with. It is clearly a case of local soil conditions.

3. Lack of iron in the soil. The quick-growing grape sometimes requires more of this substance than is available in the soil during the short period of growth, with the result that the leaves remain yellowish instead of assuming their rich dark green. A row of grapes in a vineyard suspected of lacking iron was treated last spring with iron sulphate, half pound per vine, and this row was markedly improved by the treatment; its foliage was larger and darker and the cane growth more vigorous than in the adjacent rows.

OAK.

Gloeosporium nervisequum on oak leaves.—Oak leaves were found in a number of cases scattered over the Niagara peninsula, in which there were dead areas bearing Gloeosporium nervisequum. In some of these trees, 75 per cent of the foliage was badly affected. It is suspected that the leaf areas were first killed by prevalent late frosts, and that the fungus gained entrance thereafter. Many trees were observed in which the same frost burn was present, but which had no sign of the fungus on the dead parts of the leaves.

OLEANDER.

Oleander leaf spot.—Oleander leaves affected by what is taken to be Cladosporium microsporum (Fig. 1, Plate 4) were sprayed with Bordeaux mixture and the results indicate thorough control by this means.

ONION.

Botrytis rot of onions in storage.—Large losses are often sustained by grocers and dealers, who handle large quantities of onions, from a soft rot due to a Botrytis. Three hundred crates of onions imported from Spain were destroyed in this manner in the storehouse of one wholesale grocer in St. Catharines, and similar cases are reported from other places. Local grocers are sometimes troubled with this disease as well, which, though occasionally seen in the field, is serious only in storage. It is the practice to freeze enions in the fall and keep them frozen until they are to be disposed of, when they are used quickly before the rot can make any progress.

Cultures of this fungus were made, and it was found to produce both the Botrytis form and the sclerotia readily in culture. The sclerotia only seem to be formed in the onion at low temperatures, but both forms have been frequently found by the writer on onions kept at 40° to 50° F. (Fig. 4, Plate 4). The sclerotia formed in cultures are similar to those found on the bulbs, and are readily induced by cold. Spore inoculations on onions at room temperature (50°-60°) usually produce only the Botrytis form or at least very few sclerotia. On young onions on the market, the Botrytis form has been observed several times, but not the sclerotia.

PEACH.

The Brown rot fungus in mummified fruit.—The Brown rot fungus, Sclerotinia fructigena (Pers.) Schroet., is well known as the cause of the common rot of plums, peaches and cherries, and sometimes of apples and pears. Since the fungus in all these cases is a fruit parasite, never attacking the leaves and being found on the branches and limbs to a very limited extent, it becomes a matter of importance to find out just how the infection is passed over from the fruit of one season to that of the next. It is almost certain that on a tree well sprayed in spring the numerous spores which are lodged in the bark, buds, etc., will be entirely destroyed by the fungicide, and indeed it has been claimed that even without the spray very few if any of these spores will survive the winter. We may look, therefore, for spring infection from three sources:

(1) From spores brought into the orchard from outside; (2) from the tree "mummies"—those rotted shrivelled fruits remaining on the tree over winter; and (3) from rotted fruit on and under the ground below the trees.

In regard to the first mentioned source, it may be said that the Brown rot fungus is able to live readily on a number of dead vegetable remains and there is a possibility, by no means remote, that it may survive the winter on these, and produce in spring a crop of spores, which may be carried by the wind and other agencies to the orchard.

In the case of the tree mummies (Fig. 39, Plate 11) there is some uncertainty as to whether spores produced on these in the fall after they have rotted are able to grow in spring after adhering to the shrivelled dry fruit all winter. Attempts made by the writer to germinate these spores in spring gave in a few cases a small percentage of viable spores and in others no growth whatever. This question of held-over spores is of little moment, however, when it is remembered that the fungus remains alive in all these mummies over winter, and in the moist warm days of spring it revives its activity and produces a fresh crop of spores. The writer has tested large numbers of the mummies of plums, cherries and peaches in early spring by placing them in a covered vessel on a moist surface. After a couple of days in a warm room, they invariably produced fresh pustules of the fungus showing that it was still alive within them. There can be no doubt then that these mummies are a real and positive source of Brown rot infection in spring and early summer. The statement is often made by growers that the spring spray ought to kill everything on these mummics. To this a double reply can be made. In the first place, though lime-sulphur is a powerful fungicide for surface use, theoretically it will not kill a fungus in the interior of the mummy Its action is superficial and it dries out before the fluid has had a chance to penetrate. Secondly, there is direct and convincing evidence that spraying is of little use in this case. During the latter part of April and the first of May, mummied peaches and plums were gathered from various orchards in the neighbourhood after they had been sprayed. They were taken from orchards which may be considered to fairly represent the general spraying practice throughout the district, and some of them were from the best sprayed orchards that could be found. These mummies were tested in the same manner as the others, and it was found after a few days that fresh growths of the Brown rot fungus were started on 89 per cent of the peach mummies and on 72 per cent of the plum. In all these tests the lowest percentage obtained was on peaches, 55 per cent, while some gave as high as

100 per cent. There could surely be no more convincing proof offered of the failure of lime-sulphur to destroy the fungus in the mummied fruits on the trees, and I have no hesitation in saying that the only way to avoid the menace of infection from this source is to remove these mummies and either burn or bury them.

There is still the third possible source of spring infection to be dealt with, viz., the rotted fruit lying on or buried in the ground. In this case the infection may arise theoretically in two ways, (1) from the development in spring of a crop of spores such as occurs on the tree mummies, or (2) by the production of the apothecial or spring stage of the fungus (Fig. 41, Plate 11) from the hard black tough masses (sclerotia) in the withered fruits (Fig. 40, Plate 11). In regard to the first possibility—that of the development of ordinary spores from these ground mummies-I may say that it is only in rare cases that this has been observed to happen in spring. It must be remembered that the condition of a rotten fruit remaining attached to the tree is very different to that of one lying on the ground. The fruit on the tree dries up readily, so that the food material is not exhausted in fall and growth continues as usual in spring. A fruit on the ground, on the other hand, is kept much more moist, so that the nutriment is sooner exhausted, after which the fungus forms the tough, black sclerotia already mentioned. Apparently in going into the sclerotial condition, the fungus undergoes some constitutional change, after which it loses the tendency to form the ordinary spores. A culture of the fungus made in December, when it was just entering the sclerotial condition, has now grown for two years without reverting to the ordinary condition in which spores are freely produced. Whether or not this is the true reason, it is certain that the ground mummies rarely form ordinary spores in spring, so that this means of spring infection may be neglected.

We have still to consider the spring or apothecial stage developed from the hard, black sclerotia formed in the ground mummies in fall (Figs. 40, 41, Plate 11). With the advent of warm weather in early spring, there arise from these black sclerotic masses, small, brown, stalked, trumpet-shaped growths, each bearing thousands of spores of a kind quite different from those ordinarily seen on rotten fruit. When the mature, trumpet-shaped apothecia are jarred, their spores are shot from the inside of the cuplike top, and may be seen momentarily as a fine mist. These apothecial spores when

grown give rise to the ordinary stage of the Brown rot fungus again.

If, then, this spring or apothecial stage is found to be present in any quantity in our orchards, it would be quite important as a source of the year's infection. In order to determine its prevalence, an examination was made in the spring of 1914 of twentyfive peach and ten plum orchards in the Niagara peninsula. The ground under a number of trees in each orchard was carefully looked over and the presence or absence of the apothecial stage noted. In presenting the results, it should be stated that the figures given are probably below the real values owing to the impossibility of taking into account trees under which the apothecia had not yet developed and also those under which they had matured and vanished. In the twenty-five peach orchards, there were examined a total of 515 trees of which 239 or 46.4 per cent had apothecia present beneath them. Similarly in the ten plum orchards, 229 trees were examined and apothecia found under 181 or 79 per cent. These results are further supported by observations made in 1912 and 1913. In these two years, although no systematic records were made, the apothecia were noted to be quite as prevalent as in the present year, Judging from these three years, therefore, it is plain that the apothecial stage of the Brown rot occurs generally in quite sufficient quantity to be dangerous as a source of spring infection.

The preceding discussion makes apparent the importance of destroying the mummied plums and peaches. As regards those on the tree, it is easy to get rid of them at pruning time by knocking them off, after which the early cultivation usually given in commercial orchards will bury them and thus prevent the formation of spores. In the case of mummies which have over-wintered on or in the ground and have formed

scherotia, the following points are to be noted, since they have a bearing on the question of the disposal of these mummies:—

1. Those mummies which are buried flush with the ground are in the most favour-

able condition to produce the apothecial or spring stage.

2. If lying on the surface, they either do not produce apothecia at all or the apothecia are few and small, probably due to lack of moisture.

3. If buried too deeply they also fail to develop the spring stage. Of the numerous apothecia examined, nearly all were from mummies within two inches of the surface, and none were found arising from mummies buried deeper than three inches.

4. The production of apothecia depends largely on a continuous supply of moisture in spring, so that a dry spring or a light quickly-drying soil is unfavourable to this stage of the fungus. Apparently drying out is very damaging, if not fatal to the apothecial stage, once it has started to grow.

5. The season for the apothecial stage includes from the last week of April until about May 24th.

6. The ground mummies, like those on the trees, are not affected by the waste lime-sulphur spray from the trees, and the spring stage is produced even though the mummy has been drenched with spray.

7. Very small bits of the sclerotia are able to produce apothecia.

8. The apothecia are usually produced from the mummied fruits of the preceding year. They may in some cases be delayed for eighteen months, i.e., till the second spring, but the rule is as stated. Large numbers of plum and peach seedlings were found by the writer in 1914 with the apothecial stage growing abundantly from the outer part of the fruit (Fig. 42, Plate 11). As these seeds do not usually remain two winters in the ground before germinating, an interesting confirmation for the rule given above is supplied.

9. The spring stage has not yet been found on cherry mummies.

The obvious method for getting rid of the ground mummies is to bury them deeply, at least three or four inches below the surface, and this may be done at any time in fall or spring before the spring stage begins to appear. Disking appears to cover them at just the right depth for growth, so that this process is of little use in preventing contagion from the ground mummies. Ploughing is much better. For those who have only a few plum or peach trees which are not cultivated, it may be advisable to rake up and burn or bury the mummies so as to lessen infection, especially if the fruit is susceptible to rot. It is almost needless to add that all spraying to control Brown rot should be supplemented by some effort to prevent infection from both the ground and tree mummies.

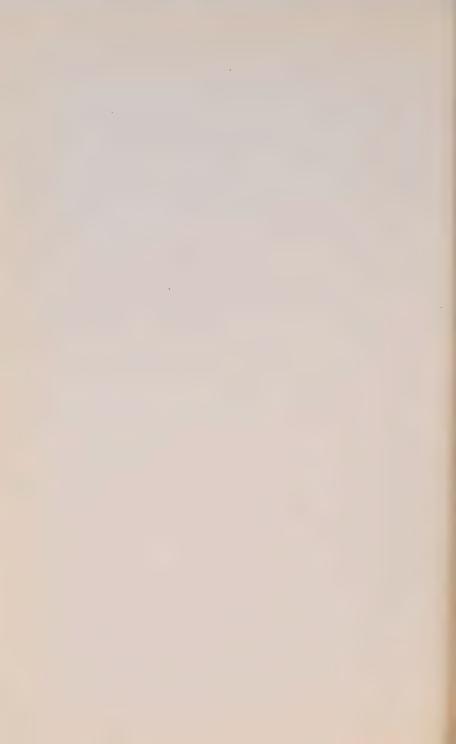
Injury from cannery refuse.—A case has been investigated where large quantities of cannery refuse were dumped in a peach orchard, the owner allowing it to be done on the supposition that the refuse would have some fertilizing value. However, the whole orchard died the following spring from the excess of acid. The trees were taken out, the land ploughed and next year it was again planted in peaches. No evil effects were seen on the second planting, and it is probable that the greater part of the acid was removed during the summer by the washing of rains or by soil neutralization.

A similar injury to the above, though on a small scale, often occurs where piles of refuse fruit are dumped. A sterile spot in the soil results, on which for a year or so nothing will grow. Such piles should obviously not be put in close proximity to trees.

Peach canker.—The prevalence of the gummosis canker (Fig. 11, Plate 6) of the peach in the Niagara District has led the writer to give this disease some attention during the last two seasons. A great deal of damage has resulted from it, both because of the killing of branches by girdling, and the total destruction of many trees



Fig. 1. Oleander leaves attacked by Chalosportion microsporum. Fig. 2. Black Rot of Tomatoes, natural. Fig. 3. Black Rot of tomatoes induced by inoculation with a pure culture of Macrosportium solucit. Two rot spots and one check are seen on each finit. Fig. 4. Botentis rot of onion. The outer scales are removed showing the black sclerotia and the gray masses of spores. Fig. 5. Irregular apples. Fig. 6. A typical specimen of the "spindly-leaf" symptom of mosaic disease of Tomato.



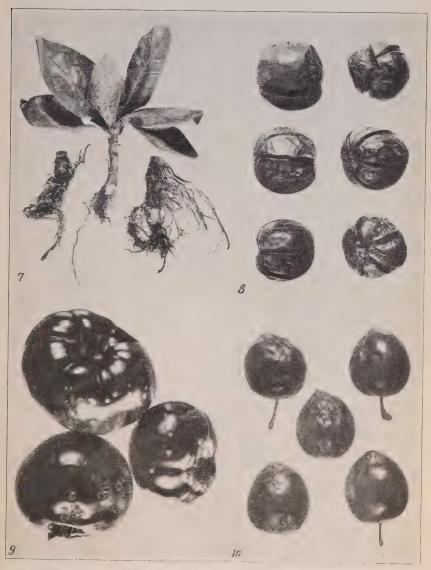


Fig. 7. Tobacco Root Rot. The rootlets are destroyed by the fungus in all three plants. The centre plant which was taken up in the fall, after growing all summer is yellowish and unhealthy in colour, and has grown only a few inches high. Fig. 8. Ogon plums, which split at maturity. Only a few perfect fruits were obtained from this tree. Fig. 9. Tomato spet or scale. The upper and right figure show early stages and the final appearance is shown in the lower fruit. Fig. 10. Spotting of Shiro plums due to Bacterium prunt.



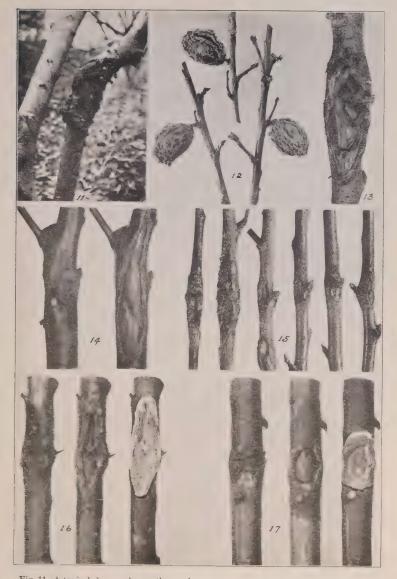


Fig. 11. A typical Gum canker on the peach.

Fig. 12. Mummy peaches, from which the Brown Rot fungus has made its way back through
the stem to the branch. The area on the branch, which has already been invaded by the fungus is
indicated by the dotted line in each case. Cankers sometimes arise from these dead areas.

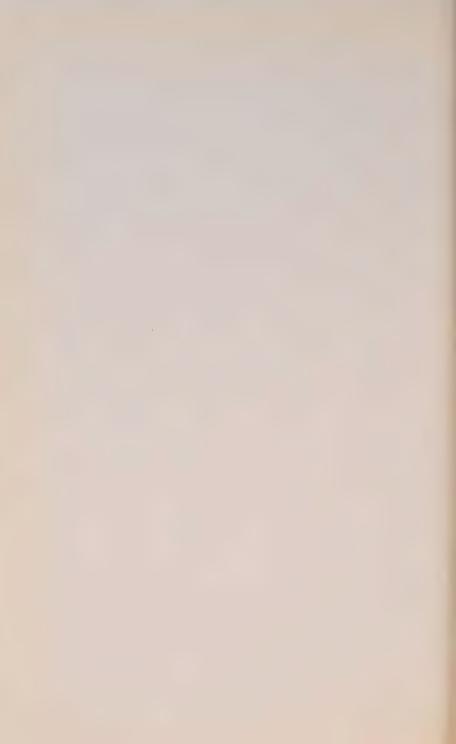
Fig. 13. An old peach canker cleaned out, and showing the two original fruit spurs by which

the fungus gained entrance to the branch.

Fig. 14. A cankered area started about the base of a dead limb. In the second photograph, the same canker is shown with the bark, gum, etc., removed.

Fig. 15. The six cankers shown arose from cracks in the twigs, due to spring frosts. The photo-

graph was made in the following autumn. Figs. 16, 17. Illustration of the method of treating canker. The first figure in each case shows the canker untouched, the second, the same canker channel out and washed with corrosive sublimate 1-1000, and the third shows it again after receiving a coat of paint.



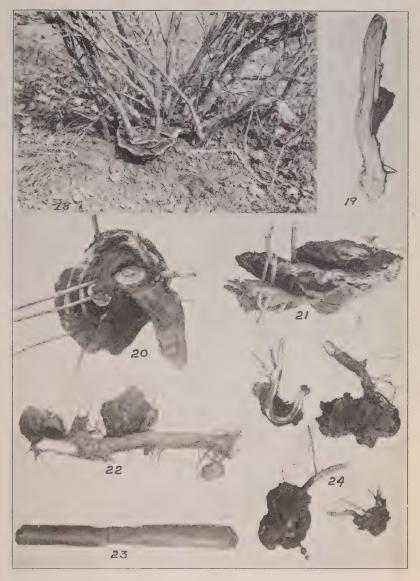


Fig. 18. Pyropolyporus ribis at the base of a currant bush.

Fig. 19. A very small sporophore growing on a wound above ground. The branch is split in two.

Fig. 20, 21. Typical sporophores of P. ribis.

Fig. 22. Large lump masses of P. ribis growing on an underground root.

Fig. 23, Sealing-wax plug constricted by the drying of a piece of *P. ribis* through which it had been inserted while the tissue was still moist.

Fig. 24. Masses of P. ribis growing on roots beneath the surface.





Fig. 25. Typical case of drooping of canes on Wilder currants. Figs. 26 and 28. Fig. 27. Several branches showing the characteristics of the drooping. The upper figure in 28 shows the effect of two consecutive cases of wilting. Fig. 29. Leaves from the affected plants showing the peculiar chlorotic condition associated with the drooping. Fig. 30. An affected cane split so as to show the brown areas in the pith.





Winter injury on cherry trunks. The result of a frost crack down the trunk associated with the destruction of the tissue within the growing region by severe cold.

Figs. 31, 32. Photographs of the trunks as they appear the fall after the injury.



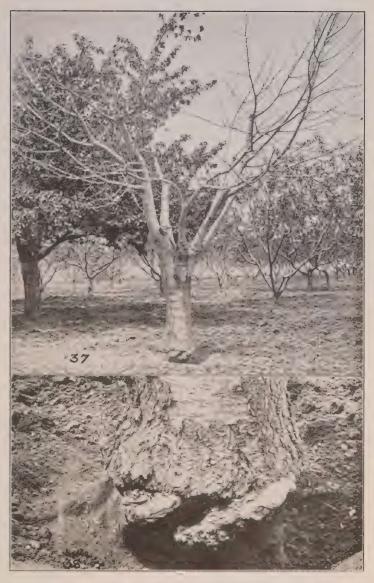
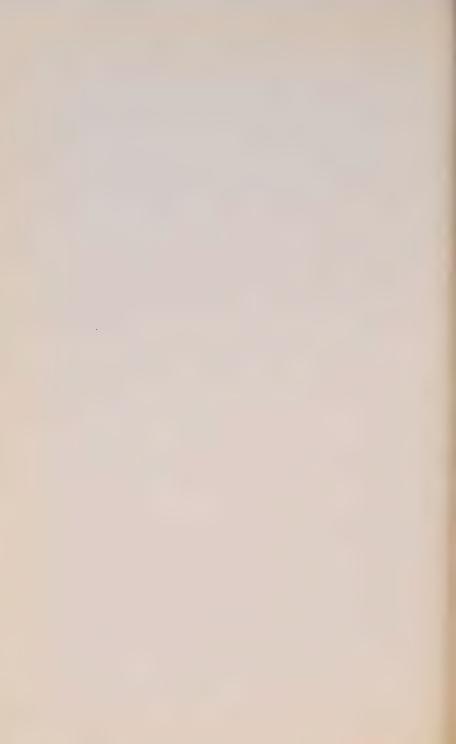
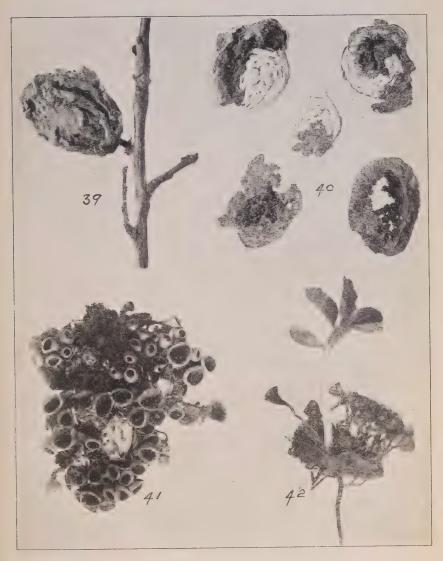


Fig. 37. Shelf fungus (Fornes applanatus (Pers.) (Wallr.) on cherry. Fig. 38. The lower phot gra, it is an enlarged view of the trunk, and shows the knoblike fungus growths at the irregular graft union.





Brown Rot on peach and plum mummies.

Fig. 39. A mummied peach adhering to the tree over winter.

Fig. 49. Sclerotia formed on fallen peaches. These Hack tough masses form in the fall, and in spring give rise to the apothecial stage of Black Rot.

Fig. 41. Cup-like or goblet-shaped apothecial stage growing from peaches over-wintered on the ground.

Fig. 42. Brown Rot apothecia on a plum seedling.



where cankers attacked the trunk. The crotches where the main branches join the trunk are often the seat of trouble, and an active canker in this region soon eats completely around the stem and kills the tree.

Numerous other trees are known to be affected by similar canker troubles, and as a great many of these are known to be due to the action of fungi, there is a strong probability that those of the peach have a like cause. Among others, Jehle in 1912 has published a paper on the subject, in which he attributes these cankers on the reach to the work of the Brown rot fungus (Sclerotinia fructigena). He has obtained this fungus consistently in cultures made from the tissue of cankers, and has succeeded in inducing cankers by inoculation of healthy peach limbs. An important point of evidence, which further connects the Brown rot fungus with canker, is in the tendency to canker formation at the base of twigs killed by the Brown rot, which has made its way down the twigs from mummied fruits remaining on the tree (see Figs. 12, 13, Plate 6). A certain proportion of cankers arise in this way, but they may also have their origin at the bases of twigs killed by other causes, or at wounds made in pruning, or even under the unbroken bark, where the possibility of parasites being the cause is very small. Moreover, cultures made from such recently formed cankers, where the bark was yet unbroken, remained invariably sterile. Even from older cankers, cultures made in this laboratory gave several fungi, but Brown rot was rarely present.

Besides these discordant details, there are certain other features which seem to indicate that Brown rot is not the only causal factor, or at least, that there are other contributory causes. In the first place, peaches have been grown in the Niagara peninsula for over forty years as a commercial crop, but it is only since the year 1908 that the canker has become noticeably abundant or indeed common. Many orchards twenty to thirty years of age still exist, and the present condition of these bears out the assertion of the older growers that, up till the time stated, there was little or no canker in our peach orchards. Brown rot has, of course, always been present, and it seems strange, if it alone were the cause, that cankers should not have been prevalent until recent years.

Again the occurrence of canker in more or less localized areas is another feature of the disease that Brown rot infection can scarcely explain, and it is to be noted that high and well-drained land is exceptionally free from canker troubles, although they have their full share of Brown rot on the fruit. The level alluvial stretch of land lying between the escarpment and Lake Ontario contains the orchards worst affected, while the higher and more broken lands about Stamford and Fonthill are comparatively free from canker.

Observations made by the writer seem to indicate that excess of water in the tree is favourable to canker, and that the lack of air, drainage, as well as superabundance of soil moisture are to be considered. In both respects, the highlands have the advantage over the level land below the escarpment. In this connection, it may be noted that the rapid extension of cankers takes place in spring when moisture in the tree is at its maximum.

There is still another factor, which it may be necessary to take into account in settling the cause of canker, viz., the effects of winter. The irritation of the canker stimulates the growth of an abnormal callus tissue around it, and an examination of this growth during the fall shows that its cambium is still active long after the ordinary growth of the tree has ceased. Such immature callus tissue is extremely liable to be killed by the low temperatures of winter, and the canker is extended in the spring. In another note, contributory evidence on this point is presented, and it is there pointed out that the tissues of a newly-formed canker, or the tissues at the edge of an older one, are strikingly similar to the tissues in a typical frost injury. There is the same browning of the wood cells and the same formation of gum cavities, both of which features differ materially from the conditions found in an ordinary clean

wound. It is possible that the origin of those incipient cankers found under the unbroken bark may also be due in some measure to winter injury, and that in other cases the same cause may materially contribute to the increase in size of cankers already formed.

No other means can be recommended for the treatment of cankers than removal of the gum and dead wood and then washing with corrosive sublimate 1-1000, or Formalin 2 per cent, after which a protective covering of paint, or some very adhesive whitewash will ensure the cleanliness of the wound for a long time. Figs. 16, 17, Plate 6, illustrate the method, and they have given good results wherever intelligently carried out. It will not pay to apply such treatment to all cankers on the tree, but in the case of those around the trunk and main limbs, which threaten the safety of the whole tree, it will pay many times over. One of the greatest losses from canker arises from the breaking down of branches in the stress of a storm, or from the weight of a crop, because the heart-wood at the canker has been weakened by rot. The course of treatment advised above keeps this wood sound until the limb has been strengthened by new growth.

Peach canker arising from frost cracks.—In the spring of 1912, there occurred several frosty nights at the time when the peach buds were swelling. In most cases, no injury followed to either fruit or foliage, as the temperature fell only a few degrees below the freezing point. In a few trees, however, which appeared to have started somewhat earlier and were therefore filled with sap, these frosts caused the twigs to split and the buds to burst from them. The injury was purely mechanical and was evidently due to expansion in freezing of the excessive amount of water in the tissues. Less advanced trees were uninjured, and all the buds on the injured trees, which were not forced off by the ice, were quite unhurt. One of these trees which was watched throughout the summer bore a heavy crop of fruit, for in it the injury was mainly confined to the sappy centre shoots.

In a few days after the injury the cracks in the twigs began to exude copious masses of gum, and sections of such twigs made at this time showed the presence of gum cavities in the wood at each side of the cracks. The general condition of the tissues at this stage bore such a striking resemblance to the features found in an ordinary canker, that the question naturally arose: Is frost injury not sometimes a contri-

butory cause of canker?

It is somewhat significant that on the tree in question, numbers of these twig cracks later on developed typical cankers, which, before summer was over, had girdled and killed their respective shoots (Fig. 15, Plate 6). It is not intended to exclude in this case the possible later infection of these cracks by Brown rot or other fungi. Such infection was extremely liable to occur, but even if the production of the finished canker is attributed to the action of fungi infesting the crack later in the spring, such an assumption does not invalidate the conclusion that the frost in this case produced not only a wound, but a wound of such a nature as to be favourable to the formation of a cauker, and exhibiting the pathological features of the tissues found in ordinary cankers. As mentioned in another connection, there is some ground for suspecting that the killing of soft or unripened tissue by freezing may be a contributory factor in the annual increase of old cankered areas, and the behaviour of the twigs split by frost is confirmation of that suspicion.

Germination of peach pits from yellows trees.—It has been contended by many nurserymen that pits from diseased peach trees are not capable of germination and that, therefore, there is no danger of introducing the Yellows and Little Peach through the seedling stock used in budding A good deal of divergence exists among the results of various investigators who have tested diseased pits, so it was considered advisable to make further tests with locally produced seeds. One thousand two hundred pits were taken from fruit of badly diseased trees, and these pits were buried over winter in six

inches of soil. In the spring they were cracked and without allowing them to dry out, they were planted in rows in light but fertile soil. Of these, 8 per cent grew and produced seedlings perfectly healthy in appearance. Concurrent experiments by Mr. L. Caesar, Provincial Pathologist, carried on in a similar way, but with pits from other sources, gave also between 7 and 8 per cent of germination.

These results show that where home-grown seed is used for nursery stock, there is some danger of the disease being carried into the orchards by means of infected nursery trees. The seedling trees at the age of two years showed no sign of disease.

Cracking of peaches.—A good many Crawford peaches were noted during the peach season, in which a large crack had developed at the stem, often extending into the pit which was also split open. Sometimes gum was produced in these cracks, and in many cases fungi had invaded them, rendering the peach somewhat unsightly. The Macrosporium so constantly associated with Brown rot on mummied peaches was the most prominent of these fungi. The cracking, it is believed, resulted from rapid and unequal growth of the fruit in the warm, moist weather, which succeeded the pronounced midsummer drought.

Winter injury to peach buds.—The winter of 1913-14 will long be remembered by the peach growers of the Niagara peninsula as the year of the "Big Freeze." Never before in the history of the local peach industry was there such wide-spread failure of this crop. Only a few orchards bore fruit at all, and these in small quantities, while hundreds of others had from a few dozen peaches down to absolutely none.

In such a remarkable year, it is well to carefully note the various factors which resulted in this failure, and to lay by for future use whatever lessons may be gained therefrom.

The fall of 1913 was characterized by an abnormally high temperature, which also persisted long into what should have been the winter period. There were a few slight frosts, but in general the ground remained unfrozen until January 15. Although wood growth did not occur to any extent on account of this open weather, the fruit buds developed far too much and consequently were in no condition to meet severe cold. Within a few days after this date, the temperature fell to nearly 15° F. Afterwards a period of milder weather set in, followed by a second and more extended cold wave in February. Although the actual records are not available, it would seem that the temperature did not fall much if any below the danger point which, for the district, is considered to be about 15° F. Owing to the tender condition of the buds, however, and to the suddenness of the attack, the results were disastrous to the peach crop.

Besides the destruction of the fruit buds, other injuries due to severe winter conditions were found to be much increased in number. Twig killing or "Dieback" was noticeably more pronounced, and a larger number of trees than usual died of Collar rot during the ensuing summer. Heart brown of the wood also occurred in a large number of orchards.

All these losses, however, were quite insignificant compared to the destruction of the peach buds, and any lessons that may be learned are particularly valuable in so far as they give hints as to means by which future protection may be secured. It is unfortunate that the injury was so universal as to give fewer means of comparing the advantages and disadvantages of different conditions, than a less complete destruction would have allowed, but there are still a few clear and outstanding features which are worthy of consideration.

In the matter of varieties that escaped, there is little to be said, as there was a great lack of uniformity in this respect. Probably on the whole Elbertas suffered most, while a list of the varieties that survived would include E. St. John, Longhurst, Early Rivers Fitzgerald, Triumph and one or two others. Seedling trees were in several cases noted to be less injured than the ordinary budded stock. The severity of the freezing was such, however, that any extended comparison of varietal resistance was impossible.

Again there were several orchards or small districts which escaped complete destruction and bore a small crop. In such cases, nearly all varieties were represented, although those in the list given above were least injured. Such small areas occurred at Queenston, St. Davids, Fonthill and Grimsby, with a few scattered orchards and individual trees elsewhere. In some of these cases it is very difficult to account for the freedom from injury, while in others the favouring factor can be readily seen.

In one or two cases, proximity to the lake seems to have been responsible for some slight immunity, but this was of such small general importance as to be negligible. The chief factor in the escape of both individual trees and of orchards seems to have been good soil drainage, which gave dry conditions during the fall and retarded the development of buds. Dulverton orchard at Queenston and some Fonthill orchards are examples of this. In the former, the soil is a coarse and deep gravel draining into the Niagara river; in the latter, the land is hilly and the soil a deep, sandy loam. There are numerous individual cases which confirm the view that the presence of too much water rather than extreme cold was the prominent factor. In several cases, limbs broken down but still attached to the tree bore blossoms while the rest of the orchard was blank. In one orchard parcelled out in building lots, several trees, which had been cut off in the lots and left for two years weed grown and uncultivated, bore blossoms and set fruit, while the rest of the orchard had nothing. Cankered limbs seemed to survive better than healthy ones, and weakly trees were surprisingly safe, presumably because their buds were less advanced than those of their vigorous neighbours.

Some protection was afforded in certain instances by snowbanks which covered a limb or part of it, and a few trees in protected garden orchards in the town of St.

Catharines bore a small crop.

It may be that very little can be done to protect an orchard from a winter such as this, but it is probable that, where we have to undergo one such winter, we shall have twenty others less severe in which a little protection will be valuable. The evidence shows that every means that can be used to dry out the soil in the fall, and thus retard the development of the fruit buds, tends to secure safe wintering. The various means that may be adopted for this end include:—

1. Thorough drainage, by under-drains, if necessary.

2. Avoidance of late cultivation which retains soil moisture. It is advisable to cease cultivation as soon as enough moisture to develop the crop can be assured.

3. Cover crops can be planted to advantage. They take up and evaporate the soil water and also temporarily retard the growth of the tree by taking up some of the readily available food material.

PEAR.

Pear blight epidemic.—During the spring of 1914 this disease, variously known as Pear Blight. Blossom Blight, and Fire Blight, attained the importance of an epidemic in orchards throughout a great part of Ontario, and in not a few cases caused immense damage. For the better understanding of a discussion of the causes which led up to, and favoured the excessive development of the disease this year, it may be valuable to note first a few of the outstanding features of the Pear Blight disease.

It is caused by bacteria, which infect the soft or sappy tissues of apple, pear, and quince trees, and which destroy the blossoms and young fruit (Blossom Blight), twigs (Twig Blight), leaves and shoots (Fire Blight), or limbs and trunk (Body Blight). Usually all the bacteria in an affected limb die during the winter, owing to the drying out of the tissues, but in a few cases they remain alive, and it is from these that infection starts again in spring. The infection is spread to the blossoms mainly by insects, and when a few blossoms are infected the bees readily spread the organism to other trees and to other orchards. The bacteria develop very rapidly in the blossoms, and

these are killed, after which the organism works its way down into the twigs and limbs. killing them as it progresses. In apples and quinces, there is usually nothing more serious than blossom and twig destruction, but in pears, and especially in susceptible varieties, large limbs and even whole trees are destroyed.

The means adopted to control Blight in pears involve (1) cutting out thoroughly and remorselessly all blighted limbs in winter time, and (2) regularly inspecting the orchard during the summer and taking out all blighted parts, taking care to cut well below the apparent limits of the disease. It is necessary to cut from six inches to a foot below the apparently diseased part because the bacteria, in summer at least, have usually advanced much farther within the limb than is indicated outwardly by the black and shrunken bark. It is probable that when the bacteria have ceased to advance rapidly, as might be expected in late fall and winter, the blackening and shrinking of the bark more nearly keeps pace with the progress of the organism within, and for this reason it is not necessary in winter pruning to cut so far below the apparently diseased area as in summer pruning. In Text Fig. 1, there is shown diagrammatically the difference between the summer and winter conditions in this respect.

With the above outline of the disease by way of preface, a few remarks concerning the epidemic of 1914 may be now made. In reviewing the situation, it is necessary to go back to the fall of 1913, which, it may be recalled, was exceptionally mild and more than usually moist. Because of these weather conditions, the trees did not dry out sufficiently to cause the death of the bacteria in the blighted limbs then existing. In consequence, there were far more of these limbs than usual in which the bacteria were safely wintered. It should perhaps be added that the numbers of such blighted limbs were not reduced, as they should have been, owing to neglect and lack of vigilance at pruning time, so that in the spring of 1914 the sources of infection were far more numerous than in ordinary seasons.

During the spring weather conditions again helped the disease. The weather record at blossoming time shows a period of fine, bright, calm days—ideal weather both for the development of the bacteria in the nectar of the blossoms, as well as for the activity of bees, which were thus able to spread these bacteria thoroughly all over the orchard. Doubtless other insects also played a part in inoculating twigs, leaves, and blossoms, but evidence as to the work of bees is clear and unmistakable. The general result was wholesale inoculation of apple, pear, and quince blossoms. With regard to apple and quince, there was comparatively little damage beyond the blossom and twig blight, and its consequent effect on the crop, but the infections on the pear progressed from these initial points in a way that was disastrous.

Here again for the third time weather conditions were on the side of the disease, for all spring and summer up till the end of June were so wet that moisture in the tree was plentiful, and the growth consequently was soft and sappy, thus presenting the very conditions favourable to the growth of the bacteria within the limbs. During this period, even in Kieffer pears, which are to some extent resistant to limb and trunk blight, the disease made discouragingly rapid progress, and large limbs and whole trees were destroyed. In more susceptible varieties such as Bartlett, the damage done in some orchards was irreparable.

It may be that only an occasional year will bring such an epidemic as this, but there is no doubt that, when weather conditions are again favourable, the same thing will happen in due course. We cannot control the weather, but the course of this epidemic points out in a very striking way the necessity of eliminating from the orehard during fall and winter every bit of blighted wood which might carry live bacteria over into the succeeding season, and which might in this way be the focus, so to speak, from which widespread destruction might develop.

Sunburn on pear foliage.—In common with a number of other trees, both wild and cultivated, occasional cases of sunburn were met with on pear foliage. No serious

Text Figure 1.

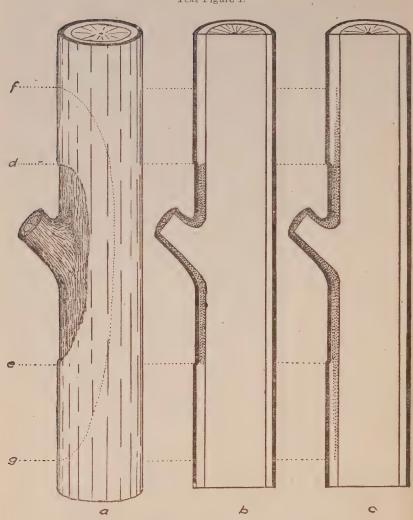


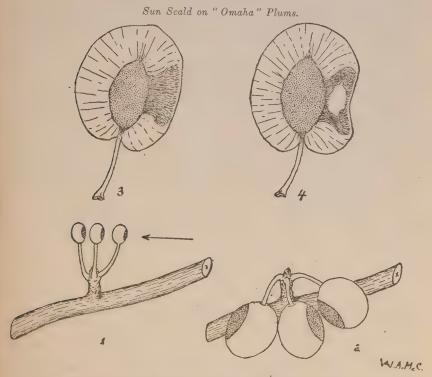
Diagram of branch of pear affected by Blight.

a. Exterior view showing darkened and shrunken bark (d-e). b. and c. Sectional views of same branch (v in white, c in summer), the bacteria indicated by dotting.

In cutting out the blighted area shown in a in winter, a cut between e and g would be below all bacteria. But in summer pruning a cut between e and g would be right into the infected area as seen by a glance at o. In order to get below the bacteria in summer, it will be necessary to cut below g, or, in other words, 6 inches to a foot below the apparent limits of the diseased area.

damage was done in any case, but such injury is liable to be mistaken for the work of the Blight organism. One point of difference was noted, which helps to distinguish the sunburn from Blight. In cases of sunburn, there are usually some leaves slightly injured, and it will be found that these have the dead areas between the veins. In this as in other cases, the sunburn resulted from hot and dry weather following a moist period, wherein the leaf growth was rapid, soft, and unresistant to drought.

Text Figure 2.



1. Young plums at the time of injury.—The dark spot indicating the injury is on the south side, the arrow showing the direction of the sun's rays.

2. The same three plums later.—In drooping over the spots were in some cases turned away from the sun.

3. Section of an affected plum.—The brown scalded area is indicated by dark shading.

4. A more severely injured fruit.—In this case the brown tissue has collapsed leaving a cavity.

PLUMS.

Sun scald of plums.—During the summer of 1914, attention was called by F. M. Clement to a peculiar spotting of Omaha plums at the Vineland Horticultural Experimental Station. These plums were large and well shaped, but a large proportion of the fruit on the two trees of this variety developed dark tissue in the flesh on one side at maturity. On the surface the skin was unbroken but the area above the spot was

depressed slightly and minutely pitted owing to the collapse of the lenticels. A diagram of a section of an affected fruit is shown in Text Fig. 2 (Fig. 3). The brown tissue extends in wedge fashion from the skin to the pit, and in some cases this dead portion has collapsed leaving a cavity (Fig. 4). No fungus filaments were found in any of these fruits, nor did the browned area extend when the plums were kept in a warm room for over a week. Test tube cultures of the affected tissue remained sterile. From the fact that the great majority of these spots were found on the south or southwest sides of the fruits, it is considered that this spotting is a form of sun scald (Fig. 1). The fact that in some cases the spots were on a surface not directly exposed to the sun does not necessarily conflict with this view. The dropping of the fruits when increase of weight took place would obviously bring about a change in orientation with reference to the southern exposure as illustrated in a diagrammatic way in (Fig. 2).

Such an interpretation would indicate that the injury must have occurred at a comparatively early stage, and it is interesting to note that the weather record is in agreement with this view. June, 1914, was cool and moist, but was succeeded by a hot dry July, thus presenting ideal conditions for an injury of this nature.

No variety other than the Omaha was affected in this orchard, but it is probable that a number of other varieties might suffer in this way, when the weather conditions are favourable.

Splitting of plums.—Several cases have come under notice where Japanese plums principally of the Ogon variety have developed splits in the fruit at or near maturity. The splitting extends uniformly from the stem and around to the opposite or style end in meridian fashion, and the fissure ordinarily reaches halfway to the pit. (See Fig. 8, Plate 5.) In several orchards this variety has been entirely discarded because of the impossibility of getting perfect fruit.

Bacterium pruni on Japanese plums.—This parasite has been met with in only one orchard in the peninsula on Japanese plums (Shiro). Several other varieties were slightly affected but from 20 per cent to 30 per cent of the Shiro fruits were more

or less spotted by the disease (see Fig. 10, Plate 5).

RASPBERRY.

Raspberry cane blight (Coniothyrium Fuckelii. Sacc.)—This disease was present in a number of fields in the district, but was particularly severe in one field of the Gregg variety, and Bordeaux mixture was tried on this field. Careful sprayings were given on the following dates: 1912, November 20; 1913, April 21, May 6, May 31, June 23, August 19, September 6.

During 1912, the old canes had been allowed to remain until October 26, but in 1913 they were taken out on August 15, shortly after the last of the crop was picked. In 1912 only half the field was sprayed, but, beginning with August 19, the whole field was treated. In spraying, care was taken to cover every part completely, and to thoroughly drench the old cane stubs at the earth's surface.

In spite of the number of these sprayings and the care exercised in their application, no benefit whatever resulted and the blight was just as bad in the sprayed as in

the unsprayed portions.

The infection of the young canes was carefully watched for, and, though the old canes began to die from May 15 on, there was no sign of blight in the young growth till the first two weeks in July. Infection occurred in the following ways:—

- 1. Through the pruned ends of young growth topped to encourage side shoots. This was by far the most common means of infection.
 - 2. From dead leaf stalks on the stems.
 - 3. From small wounds such as thorn scratches, etc.
 - 4. From one cane by way of the underground stalk to an adjacent cane.

STRAWBERRY.

Botrytis rot of strawberries.—A number of strawberries showing bleached soft watery areas have been examined. In all of them, fungus filaments were present in the soft-tissue. Test tube cultures from such tissue invariably gave a Botrytis growth, and affected fruits kept in a moist chamber developed external growths of Botrytis in a few hours. In the field, this rot was found to be present on fruits in all stages of ripeness and half-grown berries were frequently seen shrivelled up and covered by the same fungus. The rotting of the fruit was serious in one or two fields. It was most severe in conditions of high humidity, especially where weeds had been allowed to grow, and thus retain air moisture during the day. During a few days of warm and very damp weather, there was a great deal of the rot in the two fields mentioned, but it almost disappeared during the ensuing hot and dry period.

SWEET PEA.

Mosaic of sweet pea ("Streak").—This disease was found to be prevalent in an Ontario greenhouse in the winter of 1912-13, and was so general among the plants that a good deal of loss resulted. The origin of the infection cannot be explained. Efforts were made to inoculate the disease, as is readily done in the case of tomato and tobacco mosaic. The juice from the macerated leaves of diseased plants was injected near the growing points of ten healthy plants growing in the laboratory, for which purpose a fine-pointed hypodermic needle made of drawn glass tubing was used. The inoculation was again performed in a similar way after two weeks' time, but the plants reached the flowering stage and died without showing any signs of the disease. Mr. L. Caesar, the Ontario Pathologist, in similar inoculation experiments concurrently carried on, found the disease transmitted in this way, but only a small number of his inoculations were successful.

As additional tests, seeds from affected plants were sown in clean soil and seeds from clean plants in soil taken from the diseased beds. In both cases, the resulting plants matured and blossomed without showing disease.

From observations made in the greenhouse in question, it seems probable that, as in the case of the tobacco mosaic, the disease is spread from plant to plant by insects.

TOBACCO.

Tobacco root rot.—The tobacco fields in Essex County, Ont., have for some time been troubled with the root rot (Thielavia basicola (B. & R.) Zopf.), which has spread to such an extent as to seriously affect the crop over large areas. This disease is well-known in the tobacco regions of the United States, and no satisfactory remedy has as yet been found for it. Fig. 7, Plate 5, is a photograph of the roots of three plants in which the disease had been at work throughout the season. The rootlets are destroyed as fast as they are formed, and when the plant is pulled up the rootlets break off very easily. An examination of the root system of a diseased tobacco plant will show that the rootlets are dark, dead and discoloured. The root rot does not kill the plants outright, but retards their growth so much that they are worthless. The top has been left on the central plant in Fig. 7. The leaves on it are small, yellowish and sickly, and, although this plant had been in the field all summer, the top had made only a few inches of growth during the season.

TOMATO.

Mosaic dusease of tomato.—This trouble was found in several fields in 1912, and in three of these it was so bad that some attention was given to a study of the disease during the following summer, mainly to determine, if possible, what factors are involved in its occurrence and spread under field conditions.

Symptoms.—Mosaic may be recognized readily in the foliage, especially in the younger leaves. These have either patches of light or yellowish-green interspersed throughout the normal dark green of the leaf, or in the case of worse affected leaves, the greater part of the leaf surface may be of the lighter colour and the normal dark green areas appear in patches. Since there is a tendency for the dark green areas to grow more rapidly than the sickly yellowish portions, the dark green normal tissue will often be found blistered and distorted from being thus cramped and confined by the surrounding yellowish areas. There is also a tendency in mosaic plants to produce narrow leaves, and, in some extreme cases, the leaf surface is so reduced that the plant becomes almost grass-like in character. The name of "Spindly Leaf" is most appropriate for this feature of the disease, and the appearance of such leaves is illustrated in Fig. 6, Plate 4. "Fern Leaf" is another form of mosaic leaf growth occasionally met with, in which a large number of small leaflets arise from the main rib instead of the few large leaflets found in the normal leaf. Neither "Spindly Leaf" nor "Fern Leaf" are common in the field, the normal form of the disease being the true "mosaic" or patterned leaf described above. The mosaic symptom has been recorded as occurring on the fruit, but has never been met with by the writer. Whether because of the mere weakening of the plant, or through some direct activity of the disease, the blossoms on affected plants often do not mature, and hence there is a smaller setting of fruit on them than on healthy plants. Ordinarily this is of small consequence, as, on slightly affected plants, a sufficient number of blossoms are left to ensure the crop, but when plants are badly affected, there is a marked lessening in the number of fruits set as well as in the size of the fruit. Cases of "Spindly Leaf" set very few fruits, and even these remain small, so that such plants are worthless. In the three fields previously mentioned as being badly diseased, the loss due to the disease was estimated at from 20 per cent to 50 per cent.

Extent of the disease.—Beyond the examination of a few diseased fields, no data were obtained regarding the prevalence of mosaic in 1912, but in 1913 there were examined sixty-one fields, out of which 15 (or 26 per cent) had the disease present to a greater or less extent. In none of them was it so serious as to cause great damage, and in many cases only a plant here and there was affected. No fields were met with, which had an infection approaching that of the three observed in 1912. It is possible that seasonal variations affect the virulence of the disease, but several years of observation are necessary to establish this point.

Infection. A consideration of the factors that might be involved in the maintenance and spread of mosaic leads to an investigation of the following possibilities:—

- 1. Does the disease remain in the soil over winter?
- 2. Is it transmitted through the seed?
- 3. Does the seed bed play any part in infection?
- 4. Is the disease transferred from plant to plant in the field, and, if so, by what means?

An attempt was made to obtain an answer to the first question by setting out clean tomato plants on the three fields found diseased in 1912. In one of these, the whole field of about one acre was replanted. In the second, 25 plants were grown in the space marked by six young trees, in which space the disease was known to occur in 1912; and in the third, 16 plants were also placed in a diseased square marked by young trees. In the last-mentioned case, additional evidence was furnished by volunteer plants, which came up here and there throughout the rest of the field. Not a single case of mosaic developed in any of these fields, either among the plants set out or among the volunteers. The evidence is, of course, too meagre to justify any general statement, but shows that under some circumstances at least, the disease is not transmitted in the soil. On the other hand, the observations from the 61 fields examined show that the disease is usually worst where tomatoes were grown the previous year.

The second question, that of transmissibility through the seed, was also dealt with, and seeds collected from the worst diseased plants found in 1912 were grown again in 1913. In order to check the results, some were grown in four different places, viz.: Ontario Agricultural College, Guelph; Central Experimental Farm, Ottawa; Vineland Horticultural Experimental Station, and St. Catharines. None of the plants grown in the three first-mentioned places developed any trace of the disease. Of the 39 plants set out near St. Catharines, six developed the disease late in the season, and there is almost a certainty that the disease was not inherent in these, but was contracted from a diseased plant accidentally placed at the end of the row. The six affected plants were all at this end of the row, and, as previously mentioned, did not develop the disease till late in the season. The results of this work are not conclusive, but they indicate a strong probability that the disease is not transmitted through the seed.

There is good reason to suppose that the seed bed is the source of a good deal of infection. Mosaic plants are often found in rows in the field, half a dozen or more consecutive plants in the row being diseased while those adjacent in adjoining rows are clean. Since plants show the disease thus shortly after setting, before there is time for field infection to appear, it would seem that this peculiar occurrence of the diseased plants can best be explained by seed bed infection. In the ordinary method of putting out plants, those from the same part of the bed are likely to be planted consecutively along the row in many cases. I am assured by several growers of much experience that changing the seed bed often, reduces the disease or eliminates it altogether. Several cases have been met with where plants obtained from one seed bed show disease while adjacent parts of the field planted from another seed bed remain perfectly clean.

That the disease is transmissible from plant to plant, there is no doubt. Various investigators have shown that by injection of the juice of diseased plants into healthy ones, or even by rubbing the plants together, or touching one and then the other, the disease can be induced. Six plants injected with the juice of diseased leaves in this laboratory showed the disease in fourteen days. It is very probable that the disease is spread in the field either by insects, as in the case of tobacco, or by the brushing of the plants by the cultivator harness, etc. No satisfactory evidence has yet been secured on this point.

Spotted tomatoes.—Specimens of tomatoes affected by a superficial black spot see Fig. 9, Plate 5) have been examined by the writer. The spots began as small circular white or yellowish areas under the skin, and, as the prick of a needle on green or half ripe fruit produces in a few days identically the same appearance, it is probable that insect punctures are responsible for the condition in the field. Later on the spot enlarges, becomes scabby and very black. A very few stray fungus filaments were found in some but not constantly enough to suggest fungus infection. Cultures made from the inner tissue of the spots remained sterile, and the spots on fruits kept in warm, moist conditions developed no further. No rot was caused in any case, the spot being purely superficial, so that the tomatoes were not injured for canning, although their appearance was spoiled for market purposes. That there are certain field conditions conducive to the trouble is evidenced by the absence of any blackening in numerous other cases, where similar white spots resulting from insect punctures have been met with elsewhere. Neither did the needle pricks, which produced the initial stages of the spotting in tomatoes grown on vines in the laboratory develop any blackening. It is suggested that the sulphur compounds in natural gas, which is abundant throughout the district where this spotting was found, may be responsible for the blackening of the spots.

Tomato black spot or black rot.—The causal fungus in this case (Macrosporium solani, E. & M.) is usually considered mainly as a leaf parasite by most authors. It is with us of little importance in this respect, and is found only occasionally on leaves

declining in vitality. On the fruit, however, it does occur as a rot fungus, in some cases so plentifully as to cause considerable loss (Fig. 2, Plate 4). It has been found by the writer most abundantly in weedy, and therefore humid situations, and was worst in the late fruit of early tomatoes. In order to determine that the rot was brought about solely by this fungus, cultures were made both from spores and from mycelium in the rot spots. Green and almost ripe fruits were then inoculated under proper antiseptic conditions, and with checks. In each of the ten inoculations made, rot spots were produced which gradually involved the whole fruit. The checks remained quite free (Fig. 3, Plate 4). It was evident from examination of the rotted fruits in the field that infection took place at insect punctures or other small wounds.

Dark green or blue green colour due to cold.—The cold, damp weather of the spring of 1913 caused a large number of the early set tomato plants to assume an unhealthy dark-green or bluish shade, and this condition was associated with very slow growth. Warm and sunshing weather, however, soon restored them to a normal state of foliage, and no evil effects followed except the loss of a few days of early growth.

"Sooty fungus" on tomatoes.—Some young tomato plants were sent in, which were said to have a sooty fungus on the leaves. The leaves were covered with a black sprinkling much resembling the growth of a superficial fungus. Examination showed that this coating consisted of spores of Coprinus species, which had evidently grown in the hot bed and had shed their spores on the plants before transplanting.

5. GENERAL.

The preparation of nitro-culture.—During the last month of the year, it was deemed advisable for this division to prepare nitro-cultures of alfafa, red clover and peas for distribution to the branch Farms. This material is a pure culture of the organism found in the nodules on the roots of these plants. It has been shown without doubt that the function of these organisms is to fix the nitrogen of the air for the use of the plant. This constitutes the reason for these legumes being soil-improvers—through the agency of these bacteria they actually add nitrogen to the soil in which they are being grown. It very often happens that the soil in which the leguminous crop is sown does not contain this organism, so that no nitrogen fixation takes place. It is in these cases that the nitro-culture becomes of very great use; for the pure culture is mixed with the seed before planting, so that the bacteria can enter the young plant as the seed starts to germinate.

The system adopted for the isolation and multiplication of these legume bacteria was that of F. C. Harrison and B. Barlow given in the Trans. Roy. Soc. Can. Second Series, Vol. XII, Section 14, p. 157, and is as follows:—

The nodules are carefully washed in water to remove all adhering soil particles and then soaked for two minutes in a solution containing a small quantity of bichloride of mercury and hydrochloric acid, taken out and placed on filter paper slightly moistened with the same solution, to remove the excess of liquid on the nodules. They are then placed in sterilized water for a few minutes, one of them removed with sterilized forceps, and a longitudinal cut made in it with a sterilized, sharp, chisel-pointed needle. The point of a sterilized platinum needle is then inserted and moved around in the cut and dipped into a drop of sterilized water in a sterilized Petri dish, and into this is poured the medium in which these bacteria have been found to grow best, viz., a modified Ashby wood-ash agar. The cultures are then incubated at 20° C. In three to five days typical glistening and slightly opaque surface colonies will be seen, and transfers are made from these to a sloped tube culture.

To make sure that the organism isolated is really the one that inhabits the nodules of the plant under consideration, several tests have to be made, which are as

1. In culture, the organisms are very typically surrounded by mucilaginous sheaths: this can be demonstrated by air drying some of the material on a slide, flooding for an instant with water, and immediately flooding with gentian violet stain. This treatment causes the mucilage to contract and assume certain patterns or figures composed of bands and strands of fine or coarse intricately interlaced filaments, form-

ing usually quite regular hexagonal figures.

2. Another distinguishing stain is the Kiskalt's Amyl-Gram. This is the same as Gram's stain, except that amyl alcohol is used instead of ethyl alcohol as a decolorizing agent. That is, some of the material is fixed on a slide, gentian violet added and warmed slightly over a flame for about half a minute, poured off and the slide flooded with a solution of iodine in potassium iodide for two to five minutes, and then discoloured with amyl alcohol. This stains the bacteria deep violet in a colourless back-

ground.

3. After the pure culture has passed these two tests, a final one is made by planting some seeds of the legume under consideration in six pots of sterilized soil with the seeds treated with the culture in three of them and untreated in the other three. When the plants are about three weeks old, they can be examined for nodules, and, if the plants from the untreated seed have no nodules and those from the treated seed have them, there is no doubt then that the culture is correct. It can then be transferred to media in bottles, and, when sufficient growth is made, it is ready to send out with instructions for its use.

RESIGNATIONS AND APPOINTMENTS.

Mr. J. W. Eastham, B.Sc., formerly chief assistant botanist, resigned his position in April, 1914, to take up a position as plant pathologist under the British Columbia government. In Mr. Eastham, the division has lost the services of a very able and painstaking official, who has rendered very satisfactory service during his tenure of office.

Mr. John Adams, M.A., formerly of the Royal College of Science, Ireland, was appointed to a position under the Destructive Insect and Pest Act in May, 1914, and later received the appointment of Assistant Dominion Botanist. The appointment of an officer possessing, as Mr. Adams does, such excellent qualifications, is most gratifying, and all the more so because of his training and previous experience.

Mr. F. Lisle Drayton, B.S.A., a graduate of Macdonald College, Quebec, was appointed Assistant Plant Pathologist and Bacteriologist in July, 1914. Mr. Drayton's work is mainly of a research and advisory nature, and the services which he has already been able to render have been throughout most satisfactory.

6 GEORGE V, A, 1916

OFFICIAL PUBLICATIONS OF THE DIVISION DURING THE YEAR OF REPORT.

Exhibition circulars:-

44. Potato Scab, by J. Adams.

45. Do you know your weeds? by Faith Fyles.

46. Apple Scab, by F. L. Drayton.

Farmers Circulars:-

No. 6: Regulations under the Destructive Insect and Pest Act governing the importation, sale, shipment and exportation of the Common or Irish Potato (Solanum tuberosum L.), by H. T. Güssow.

No. 9. The control of Potato Diseases, by H. T. Güssow.

Bulletins:-

No. 23: Second Series-Medicinal Plants and their Cultivation in Canada, by John Adams.

No. 24: Second Series-Fruit Tree Diseases of Southern Ontario, by W. A. McCubbin.

ACKNOWLEDGMENTS.

The success of the work rests largely with the members of my staff, who are in charge of special subjects. I desire here to record to all, my great indebtedness for their uniformly interested and satisfactory services rendered during the year.

DOMINION OF CANADA DEPARTMENT OF AGRICULTURE DOMINION EXPERIMENTAL FARMS

REPORT

FROM THE

DIVISION OF BEES

FOR THE

Fiscal Year Ending March 31, 1915

PREPARED BY

7	The Apiarist, Do	minion Experimental	Far	ms.			-	-		F. W. L. Sladen.
5	Superintendent:-	-								
		Station, Charlottetown								
	Experimental	Farm, Napan, N.S	-		-	-		-		W. W. Baird, B.S.A.
		Station, Kentville, N.								
	Experimental	Station, Fredericton,	N.B		-	-		-	-	W. W. Hubbard,
	Experimental	Station, Ste. Anne de	la P	ocat	ièr	е, (Qui	e.	-	Jos. Bégin.
		Station, Cap Rouge,								
	Experimental	Farm, Brandon, Man.	× .		-	-				W. C. McKillican, B.S.A.
	Experimental	Farm, Indian Head, S	Sask			-	-			T. J. Harrison, B.S.A.
		Station, Lethbridge,								
		Station, Lacombe, Alt								
		Station, Invermere, B.								
	Experimental	Farm, Agassiz, B.C.				-				P. H. Moore, B.S.A.
										L. Stevenson, B.S.A. M.S.



REPORT FROM THE BEE DIVISION

OTTAWA, March 31, 1915.

J. H. GRISDALE, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa.

SIR, I have the honour to submit herewith the first report of the Bee Division. The Bee Division came into existence at the separation of the Division of Entomology

from the Dominion Experimental Farms on April 1, 1914.

Included herewith will be found the report of the work at the Central Experimental Farm and the reports that have been rendered by the Superintendents of the thirteen branch Experimental Farms and Stations at which bees were kept in 1914, viz.: Charlottetown, P.E.I.; Nappan, N.S.; Kentville, N.S.; Fredericton, N.B.; Ste. Anne de la Pocatiere, Que.; Cap Rouge, Que; Brandon, Man.; Indian Head, Sask; Lethbridge, Alta.; Lacombe, Alta.; Invermere, B.C., Agassiz, B.C., and Sidney, B.C.

It seems best to commence this first separate report on apiculture by touching upon the principal questions and problems that confront successful bee-keeping in Canada, and showing in what way a start is being made to contribute towards their solution. It has been demonstrated that bees can be kept at all the above-mentioned Farms and Stations, though losses of bees, sometimes heavy, have occurred during the winter. Swarming has also been a frequent cause of loss, not only by swarms flying away, but by its weakening the colonies and thereby predisposing to winter losses. Swarming, too, greatly curtails the output of honey. But losses during winter and as a result of swarming are not expected to offer specially serious difficulties at any of the branch Farms because undoubtedly they may be much reduced by careful methods of management adapted to local conditions. Experimenting with various methods of wintering and of controlling swarming is, therefore, being made an important part of the experimental work at the Central Farm and also on the branch Farms and Stations.

A considerable measure of success having attended the wintering of bees outof-doors at Ottawa in cases packed with insulating material, and sheltered from wind,
this method has been tried at several of the other Farms where bees have, up to the
present, been wintered only in cellars. The results as shown in the reports from Sta
Anne de la Pocatiere, Que.; Charlottetown, P.E.I.; Fredericton, N.B.; Brandon,
Man., and Invermere, B.C., are interesting and warrant a further trial of this method
of wintering. In the notes upon wintering attention may be drawn to the satisfactory results following good ventilation of the cellar at Lacombe and to the lose
caused by unwholesome stores at Ottawa and Nappan.

It may be remarked that the commonest cause of the death of colonies of bees in winter in most apiaries is starvation, due to neglect to supplement insufficient winter stores with well-made sugar syrup at the end of September, and that the colonies that survive are weakened by losses due to various causes. To estimate the extent of these losses it is not enough to weigh the colonies in autumn and spring, because the weight lost during the winter is principally in stores. Each colony should be examined at the first favourable opportunity in the spring, and the number

of combs fairly well covered by bees when the temperature of the air outside is not far from 60° should be noted. In this way a surprising shrinkage in the population of the apiary amounting perhaps to 50, 60 or even 70 per cent, will often be discovered.

It having been ascertained that bees can be kept at the branch Farms, the principal question that arises is—What profit may be expected from the bees, taking one season with another? The profits must necessarily depend upon the available nectar within easy distance of the apiary, that is, within one to one and one-half miles. The amount of available nectar depends, in its turn, not only upon the presence in abundance of nectar-secreting flowers but upon favourable weather for secretion and for the flight of bees, and upon the nectar being within reach of the tongue of the honeybee, which is considerably shorter than that of the bumble-bee.

In order to analyse the honey yields, several of the colonies at the Central Farm and one at each of the branch Farms having bees, are kept on scales during the season, and the daily increase, or loss, of weight is recorded. When there is found to be an increase of weight, observations are made in the neighbourhood to ascertain from what plants the bees are gathering the honey, and samples are taken from the hives from time to time to test the quality of the honey.

Investigation has shown that, except possibly on the Farms on the prairie and in the dry belt of British Columbia, the bulk of the surplus honey is generally gathered from less than half-a-dozen species of plants, and in some cases from only two or three, and that the quality of the honey obtained from these plants is excellent.

The question as to the best kind of bee to keep is also being studied. In Eastern Canada the bee of the country is a black bee; on the prairie and in British Columbia it is often a hybrid between a black bee and an Italian. A change to Italian bees at the Central Experimental Farm in 1910, made primarily in order to control the disease of European foul brood, a bad outbreak of which had occurred in this apiary, has resulted, not only in the suppression of the disease, but in a substantial increase of the honey crop.

In 1914 Italian queens were introduced into some of the colonies in several of the apiaries on the branch Farms. This will enable a comparison to be made between the Italian bee and the bee of the country in different localities.

In the summer of 1914 I visited the branch Experimental Farms and Stations and inspected their apiaries, made a preliminary survey of the conditions for beekeeping in the regions served by the Farms, met some of the Provincial bee inspectors and visited the apiaries of several prominent bec-keepers located near the Farms.

The Experimental Farm at Brandon, Man., was visited on June 25. The apiary here contained thirty colonies in 8-frame hives, all of which except two were nuclei which had just been formed with young queens reared at the Farm. They were in thriving condition.

The Experimental Farm at Indian Head, Sask., was next visited, and arrangements were made for re-stocking the apiary, which recently had died out, with bees from Brandon.

At the Lethbridge Experimental Station, visited on June 29, the bees had commenced storing honey from alfalfa. As will be seen from Mr. Fairfield's report, one hundred pounds of honey, nearly all of which was believed to have been gathered from this source, were taken during the season from the only strong colony. This result is particularly interesting and encouraging, as alfalfa does not produce honey in marketable quantities in the east, and the work of the bees at Lethbridge is hampered by high winds.

The Experimental Station at Invermere was visited on June 30. In this region fair honey yields have been obtained from various sources, and the value, if any, of alsike clover for honey production when grown under irrigation is under investiga-

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tion. Unfortunately, the three colonies at the Station were not in good enough condition to take full advantage of any honey flow.

The Experimental Station at Sidney, B.C., visited on July 7, had fourteen colonies. Good success had attended the production of extracted honey, but the colonies worked for comb honey had mostly swarmed, leaving the work in the supers only just begun.

The Experimental Farm at Agassiz, visited July 8, had nine colonics in 10-frame hives. Several swarms had evidently been lost, though plenty of room had been given. At both Sidney and Agassiz the principal source of honey is evidently white clover, fireweed being perhaps next in importance.

The Experimental Station at Lacombe, which was next visited, had recently re-started its apiary with two colonies, which were doing well. Tracts of white clover were seen at Lacombe, Innisfail and Edmonton, but on the drier parts of the prairie clover fails.

The next Stations visited were those at Scott, Sask, and Rosthern, Sask. Bees have not yet been tried at either of these Stations. Rosthern, however, seems to have sufficient wild flowers to produce a crop of honey; indeed, a fairly successful apiary was located for several years in the neighbourhood. Much evidence was gathered to show that, on the prairie, the timber and scrub lands will produce more honey than the bare prairie, except where alfalfa proves valuable.

The Experimental Farm at Nappan, N.S., with eight colonies; the Station at Kentville, N.S., with eight colonies; the Station at Charlottetown, P.E.I., with nine colonies; the Station at Fredericton, N.B., with seven colonies; the Station at Ste. Anne de la Pocatiere, Que., with fifty-one colonies and the Station at Cap Rouge, Que., with twenty colonies, were visited between July 27 and August 11. At each of these Farms and Stations a considerable quantity of surplus honey had been gathered from alsike and white clover, with the exception of Nappan, N.S., where much clover had been winter-killed. The general opinion gleaned from the visit to the Eastern Provinces was that they offer a very promising field for the extension of profitable bee-keeping, which is much neglected, especially in the Maritime Provinces where both white clover and alsike clover are often abundant in many places, and the climate seldom fails to supply the right amount of moisture and heat to insure a valuable honey crop from these or from other sources.

At most of the branch Farms and Stations the apiary adjoins the poultry yard, and the bees are being looked after by the man in charge of the poultry. Each well-established apiary contains a portable and bee-proof wooden building about fourteen feet long by twelve feet wide in which the material is prepared, the honey extracted and appliances are kept.

The bees at all the branch Farms were found to be free from foul brood. However, an apiary three miles from the Kentville Experimental Station, visited on July 31, 1914, was found to be badly affected with American foul brood. The presence of this serious disease in this district had been hitherto unknown. At the Central Experimental Farm no trace of European foul brood, which had been found in 41 per cent of the colonies in 1913, could be detected in 1914.

A co-operative experiment with Mr. J. Martineau, a bee-keeper located at Montcerf, Que., has been commenced in order to investigate conditions for bee-keeping in northwestern Quebec where, on account of the rocky nature of the country, but little cultivation is possible and the bees have to depend principally upon wild flowers. Chief among these wild flowers is the willow-herb or fireweed (Epilobium angustifolium) which grows in forest clearings throughout Canada and is apt to be particularly plentiful after devastation by fire. Being but little affected by drought, this plant is said seldom to fail to give a good crop of honey. The honey from the fireweed, as produced in Eastern Canada, is nearly water-white and has a very mild and agreeable flavour.

In 1914, from 128 colonies of Italian bees, spring count, after purchasing from Louisiana in May 262 queens at a cost of \$170.30, Mr. Martineau obtained 33,800 pounds of honey which sold for \$3,594.50, and increased his apiary to 306 colonies. About 21,800 pounds of the honey were gathered between July 8 and August 30, and came almost entirely from fireweed. The remainder, roughly 12,000 pounds, was gathered during a period of very fine weather between September 11 and 22, principally from aster, and probably a little from the late-flowering species of goldenrod. The September honey-flow did not occur in the two previous years and was, therefore, unexpected. The aster honey proved to be of a light amber colour, of pleasant flavour and not unwholesome for the wintering of bees, not granulating in the combs. The species of aster from which this honey was gathered is one that grows in dry places, the flowers being of a pale blue colour. It belongs to Aster cordifolius group. The average honey yield per colony for the whole season, spring count, was 264 pounds. A strong colony on scales totaled 5071 pounds for the season. These figures give some idea of the vast amount of honey annually going to waste in Canada for want of bees to gather it.

I attended the Annual Convention of the Quebec Bee-keeper's Association held at Montreal on November 11, and the Annual Convention of the Ontario Bee-keeper's Association held at Toronto on November 12 and 13, and delivered an address at each meeting upon the rearing of queen-bees. I also attended the Apicultural Short Course held at Guelph, Ont., in January, 1915, and gave lectures there.

Mr. Geo. F. Kingsmill, B.S.A., was appointed Assistant in the Bee Division from June 29 to December 29, and rendered much valuable service. He resigned to join the staff of the Ontario Agricultural College. Mr. Kingsmill attended the Convention of the New Brunswick Bee-keeper's Association held at St. John, N.B., on September 10.

During the present year Exhibition Circular No. 18 entitled "Bee-keeping in

Canada" has been prepared and issued.

Between April 1, 1914, and March 31, 1915, 843 letters were received in this Division and 844 were dispatched.

I have the honour to be, sir,

Your obedient servant,

F. W. L. SLADEN, Apiarist.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

REPORT OF THE APIARIST, F. W. L. SLADEN.

SUMMARY OF WINTERING RESULTS, 1913-14.

As in previous years, the cellar used for wintering the bees was the one that had been prepared and fitted up for this purpose under the Farm Foreman's house, as

described in the Annual Report for 1904.

Thirty-seven colonies were placed in the cellar 'on November 10, 1913, and sixteen were left out-of-doors. The colonies wintered outside were, as in the previous winter, put into cases each holding four hives, but they were all packed with shavings. The shavings on the top of the hives were placed in bags for easy removal. The bees were wintered in a portion of the apiary around which had been erected a board fence about seven feet high to protect them from wind. During the winter the entrances of the wintering cases were reduced to 14 inches high by three-eighths of an inch wide. These entrances were on several occasions buried under fresh falls of powdery snow.

The bees were removed from the cellar on April 14 and 16. In an examination of all the colonies made on April 24 to 28 it was found that none had died, and that the bees that had wintered out of doors were on the average stronger than those that had wintered in the cellar, and had also commenced breeding earlier than the latter. They covered, on an average, 4.6 combs, while those that had wintered in the cellar covered, on the average, 3.6 combs. The bees wintered just as well in two cases which had only 2½ inches to 3 inches of shavings around the sides of and beneath the hives, with bags of shavings nine inches thick on top, as in the other two cases which had five to six inches of shavings around the sides and at the bottom and twelve inches on top.

Very few bees died in the snow. The last good flight before winter was on November 22 (temperature 63°, bright sunshine, light wind). The first extensive spring flight was on March 16 (temperature 50°, bright sunshine, no wind, and snow still on the ground). This may be considered a good test of outdoor wintering in a cold winter, as February was a very cold month.

The outdoor wintered colonies were left in their wintering cases until June, and it was noticed that they built up more rapidly than those that had been been brought

out of the cellar and set out in the apiary without protection.

The rather poor results from the cellar wintering seemed to be partly due to the temperature of the cellar being too variable, combined with insufficient ventilation. The temperature dropped to 37° in the below zero weather in February, with the chimney ventilator partly closed. The highest temperature recorded in the cellar was 54° on April 11, with all three ventilators open, but a draught of air passing through the cellar (a gale was blowing outside) the bees were quiet. Both the outdoor and indoor wintered colonies that contained a good proportion of young bees had less winter loss than those that contained chiefly old bees. The average loss of weight of the hives in the cellar was 14·4 pounds, the greatest loss 27 pounds. The average loss of weight of hives outside was 22½ pounds, greatest loss 35 pounds.

The first half of April was cold and the bees outside did not get much opportunity for flight until the others were brought out of the cellar on the 16th. From that time

forward the weather gradually warmed up.

HONEY CROP, 1914.

Warm weather during the latter half of May resulted in a honey-flow from dandelion, of which full advantage was taken by three strong colonies in the wintering cases, each of which had filled a super of shallow frames with honey, principally from this source, by June 2. None of the cellar wintered colonies stored in the super more than a few pounds of this early honey.

The first heads of alsike and white clover were seen on May 26, but the colonies on scales did not begin to increase in weight rapidly until June 19 when a few showers appeared to increase greatly the secretion from these two plants. A heavy honey-flow from this source continued with but little interruption until July 21.

From this date the supers continued to fill slowly until August 22.

The total honey crop was 2,348 pounds of extracted honey and 69 sections of comb honey. The extracted honey consisted of 120 pounds of dandelion honey gathered in May, 1,675 pounds of white honey gathered during June and July, and 553 pounds of amber-coloured honey gathered at the end of July and in August. There was only a trace of the flavour of buckwheat honey in the amber honey.

The largest yield from a single colony was 257 pounds of extracted honey. This was a colony that had wintered outside. The mother of the colony was a daughter of a queen imported from Italy, mated the previous summer with a drone of the local black variety at the Kazabazua mating station. The bees of this colony were unpleasant to handle on account of their irascible disposition.

During the latter part of September, in the early mornings, the bees were observed to be busily gathering honey-dew from an avenue of birch trees near the apiary.

The following table gives the average loss or gain in weight of a colony on scales during successive periods of about ten days during the season, with the principal source from which the honey was gathered:—

Period.	Loss.	Gain.	Principal Source of Honey.
	Lb.	Lb.	
April 20 to 30 " 30 to May 11 May 11 to 21. " 21 to 30. June 1 to 9 " 9 to 19 " 19 to 30 " 30 to July 11. -July 11 to 21 " 21 to August 1 August 1 to 10 " 10 to 22 " 22 to September 2. September 2 to 12 " 12 to 20	3.2	8·4 12·8 6·5 30·8 12·3 39·3 23·7	Willow. Dandelion and fruit bloom. " Alsike and white clover. " " " " " " " " " " " " " " " " " "

A larger crop of honey would have been secured, but for an epidemic of swarming which occurred during the clover honey flow. The honey sold quickly at the following prices: Extracted, white, in 5-pound and 10-pound tin pails, 15 cents per pound; amber, ditto, 12 cents per pound; comb honey, 20 cents per section.

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SUMMARY OF WINTERING, 1914-15.

Forty colonies were brought into the cellar on November 18, 1914, and twenty-four were left outside and packed in shavings, as in the previous winter, in wintering cases each holding four colonies.

The bees were brought out of the cellar April 7, and all the colonies in the apiary were weighed and examined between that date and April 15. Three cellar-wintered colonies had died and the rest covered, on the average, only three combs. Three colonies wintered outside had died, and the rest covered, on the average, only 2.4 combs.

There was good evidence to show that the unusually heavy loss of bee life in the cellar was associated with granulated and unwholesome stores and also with symptoms of thirst. The cappings over the stores of the colonies that lost most heavily had been extensively torn open by the bees, and the stores were found to be either granulated or of dense consistency. Moreover, the bees took the first opportunity after being brought out of the cellar to flock in large numbers to the edge of the melting snow in the apiary and suck up the water. The cellar was dry, there being no sign of mould in the combs removed from it. The colonies whose natural stores were supplemented with a considerable proportion of sugar syrup suffered, on the average, somewhat less than those in which the proportion of syrup was smaller. This syrup was made in the usual way from two parts by measure of sugar and one of water. The consumption of food during the winter was heavy and varied in proportion to the mortality. This is well shown in the following table:—

ANALYSIS OF CELLAR-WINTERED COLONIES.

	Number of colonies.	Average loss of weight per colony.
Dead		Pounds.
Dead.	3	28
Bees covering up to one comb.	2	21
Bees covering over one comb up to three combs	1.0	. 20
Bees covering over three combs up to five combs	4.0	
Bees covering over five combs up to six combs.	- 14	16
to six comps	. 7	14

The granulated and unwholesome stores probably came from aster, several white-flowered species of which, belonging to the *Aster tradescanti* group, were much visited by the bees during the latter part of August and in September, and also from honeydew.

The still heavier loss in the colonies wintered outside is less easy to explain. Fewer torn open cells were found in these hives. There was, however, a considerable amount of granulated stores which, probably, were the principal cause of the loss. It should be noted in this connection that the air at Ottawa in winter 1s extremely dry. Queenlessness, due to special manipulation in the autumn, was also responsible for some of the loss. The colonies packed in the larger cases with an extra amount of packing material again showed no advantage over those having only 2½ inches of packing material around the sides and beneath.

The bees had partial flights on November 1 (temperature 64.6°, cloudy and high wind) and on November 26 (temperature 45°, cloudy). The first good spring flight was on March 23 (temperature 45.5°, bright sun but little wind).

BEE-BREEDING EXPERIMENT.

The immediate objects of this experiment are (1) to discover a practicable way of controlling mating and (2) to find out if the non-swarming character noticeable in certain colonies of bees is inherited. Should it be found that this character is inherited it is hoped that it may be possible to produce a variety of bee that swarms but little, so that bee-keepers may be saved the great amount of labour and loss incidental to swarming.

OTTAWA.

Some ground for expecting that disinclination to swarm may be inherited is found in the fact that certain races of bees, notoriously Carniolans, are more prone to swarm than others, and many successful bee-keepers believe that by breeding from non-swarming colonies they have reduced swarming in their apiaries.

The prompt mating of queens by local drones at the mating station that had been established on the Kazabazua Plains, Quebec, in 1913, within three miles of which no colonies could be found, indicated that the elimination of mating by local drones was probably impossible. Consequently, it was decided to defer the mating this year until the autumn after most of the local black drones around the mating station had been turned out of their colonies to die, so that the proportion of mismated queens might be reduced to a minimum. In September, therefore, queens and drones were bred from a colony of Italian bees that had made no preparation for swarming either in 1913 when, during the time of dandelion and fruit bloom, about 80 per cent of the colonies in the apiary were found to have queen cells containing eggs and larvae, nor in 1914 when, during the time of clover bloom, about 80 per cent of the colonies had swarmed. These queens and drones were taken to the mating station, and a number of the queens were successfully mated during the first week in October. Fourteen of these queens were successfully introduced to colonies in the apiary at Ottawa, and will form the subject of further investigation.

TYPE OF HIVE USED AT THE CENTRAL EXPERIMENTAL FARM.

In order to make a fair comparison of the work of the different colonies of bees at the Central Experimental Farm, it has been decided to adopt a uniform type of hive.

The majority of the hives are 8-frame Langstroth hives of various patterns. The remainder are 10-frame Langstroth hives. Experience has shown that the 8-frame brood chamber does not supply sufficient breeding space; the first super that is given must therefore, be employed largely for brood rearing or swarming will be very likely to take place. But a 10-frame brood chamber is usually large enough to accommodate all, or nearly all, of the brood; in consequence, the super may be employed for the storage of surplus honey, the queen being excluded from it early in the honey flow, or prevented from entering it altogether, by means of a perforated metal queen excluder. For this reason principally it has been decided to adopt the 10-frame size and to discard the 8-frame hives.

A supply of 10-frame hives each consisting of the following parts have been put together in the winter of 1914-15 in readiness for the bees to be transferred to them in the spring: (1) Wooden stand; (2) Floor, providing five-eighths inch space under the frames; (3) Brood chamber to take ten Langstroth-Hoffman frames and a division board; (4) Three extracting supers—some of these supers take Langstroth frames unspaced, others are shallow, taking frames only 5\frac{3}{2} inches deep (a comb-honey super was furnished with a few of the hives in place of one of the extracting supers); (5) Telescope cover, with packing material between the sheet metal top and boarded interior.

This outfit is also a very satisfactory one for the practical bee-keeper, except that in regions where a large honey crop is expected the full-depth extracting supers may be used exclusively. The extracting of the honey is done more expeditiously by the use of the larger combs, and should the brood chamber become overcrowded with brood a comb or two can be removed and placed in the super from time to time. This is only one of several advantages that follow having brood chambers and supers of the same size and interchangeable. The shallow supers are employed in our experimental work, because the amount of super room given is under better control, and the bees will enter and occupy the supers more readily in spring.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

Two lots of bees were obtained when the apiary was started at the Experimental Station in 1913, namely: Italian bees purchased locally and Black bees purchased at Bridgetown, N.S. The bees from Nova Scotia were very badly damaged in shipment, and several colonies had to be united, Italian queens being introduced into all but one. Five colonies were placed in the cellar of the superintendent's residence on December 18, 1913, and they were brought out on April 27. The bee-cellar was well ventilated, had a cement floor and the temperature remained fairly constant around 45° F. The hives had the top and bottom boards removed and were placed on 2-inch by 4-inch skids and covered with four thicknesses of bran sacks. The colonies all came out strong and in good condition in the spring of 1914.

During the summer of 1914 great difficulty was experienced in controlling swarming. Four swarms were successfully hived, but a swarm of black bees escaped.

About 100 pounds of surplus honey were extracted and a small quantity of comb honey was obtained. White clover and alsike clover are the principal sources of honey here. The clover honey was of extra fine quality and very pale. During the first week in August the bees were observed in great numbers on the English lime or linden trees that are very numerous about the city of Charlottetown. The honey from this source had a distinct, peculiar flayour.

In October, 1914, a four-colony wintering case was made and the four heaviest colonies were packed in it. The covers were removed and sacks filled with shavings placed over the hives. Around the sides, on the bottom and over everything, from four to six inches of shavings were packed close. An entrance, with sliding cover to reduce its size, was made for each colony. The two colonies on the east side wintered fairly satisfactorily, but the two on the west side, which was more exposed, died, leaving large stores of honey.

Five colonies of bees were placed in the bee-cellar, described above, on November 14, 1914. The weather was extreme and the temperature of the cellar varied from 40° to 58° F., causing a considerable restlessness among the bees. When the hives were removed from the cellar in the spring three of the colonies were found to be in good condition. The two remaining hives contained no bees, but abundant stores of honey. The number of dead bees on the cellar floor did not seem to be abnormal.

Colony.	Wintered.	Weight. November 14, 1914.	Weight. April 22, 1915.	Remarks on Condition. April 22, 1915.
No. 2. No. 3. No. 4	Outside	Lb. 73½ 70½ 66 67 69 68½ 67¼ 66½ 67¼ 66½ 67% 66%	49 43 39 48 48 53 55	Fairly good. Strong. Dead. Dead. Strong. Good. Fairly good. Dead. Dead.

Eight-frame Langstroth hives were used during the season of 1913, and again in 1914. 10-frame Langstroth hives have been secured and they will be used in comparison with the smaller hive for both summer and winter experiments with bees.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

In Nova Scotia many phases of bee-keeping are still in the experimental stage. When the problems connected with these are worked out, a greater interest will, doubtless, be taken in the industry, which has been found to be most profitable. Many have been deterred from keeping bees by the fear of losing them in the winter, the care of the bees in winter and spring being a serious problem in this locality, and one that is the subject of much discussion. In the spring the prevailing north-east winds which blow from the fields of ice, always found in the Straits at that period of the year, bring a great deal of unfavourable weather about the time when it is necessary to bring the bees out of the cellar. There is, however, this to be said, they can be left outside later in the fall than in many places in the interior provinces, due to the fact that water cools more slowly than land. The warm breezes from the sea at this time of the year keep the weather mild until quite late in the fall. For instance, in 1914, our bees had a flight as late as December 2, and were not housed until the 15th.

Black bees are kept at this Farm, these having so far proved somewhat more

hardy than Italians under the weather conditions of this region.

Wintering Results, 1913-14.—During the fall of 1913-14 nine strong colonies were placed in the bee-cellar, which is in the Superintendent's house, but partitioned off from the main cellar. Sufficient natural stores were left in the hives for them during the winter. The temperature of the cellar ranged from 45° to 50°. The floor consisted of planks placed on the top of the earth.

When the bees were taken out on April 24, 1914, they were in bad condition, due to the fact that mice had entered the hives during the winter and eaten part of the

stores, and only five colonies were found to be living.

Honey Production.—The following is the production of the nine colonies during 1913 and the five colonies during 1914:—

Yield from nine Colonies of Bees for Season of 1913.

1,170 pounds extracted honey at 12 cents (wholesale price)
Total
Yield from five Colonies of Bees for Season of 1914.
550 pounds extracted honey at 12 cents (wholesale price)\$ 66 00 Three swarms worth, say, \$5 each
Total

The season of 1913 was much better in every respect than that of 1914. The spring was earlier and there was an abundance of alsike and white clover, our best nectar-producing plants. In 1914, clover throughout this district was nearly all winter killed. The spring was very late and the greater part of the season extremely cool. Only 50 pounds of honey were extracted previous to August 1, and practically all the honey was of second quality.

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The estimated relative quantities of the different kinds of honey produced in 1914 were as follows,—blueberry, 25 pounds; dandelion, 25 pounds; white clover, 50 pounds; buckwheat, 50 pounds; goldenrod, 350 pounds; and wild aster, 50 pounds.

Winter results, 1914-15.—A cement floor was laid in the cellar and, in order to protect the bees from mice, a table with legs of piping $2\frac{1}{2}$ feet high was made to receive the hives. This afforded good protection from mice.

The eight colonies were divided into three lots and prepared as follows:-

Lot 1 consisted of four colonies from which the honey was taken away and artificial stores consisting of two parts of good granulated sugar to one part of water were substituted, the syrup being fed to them through a Miller feeder.

Lot 2 consisted of two colonies, which received partly natural and partly artificial stores, the latter being the same as fed to Lot 1. The frames containing the natural stores were placed at either side of the brood chamber, leaving the centre frames to be filled with stificial stores.

Lot 3 consisted of two colonies with natural stores only.

The natural stores came principally from goldenrod, possibly a little from wild aster.

The result of this experiment was striking.

Lot 1 came through the winter in excellent condition. The cluster was not broken and the bees did not show any signs of either restlessness or dysentery, but they consumed the greatest amount of stores.

Lot 2 showed slight signs of restlessness and dysentery, but the cluster was not broken. They consumed slightly less stores than did Lot 1.

Lot 3 did not winter nearly so well as either Lot 1 or 2, showing a greater degree of restlessness and dysentery, with the cluster much broken, but they consumed the least amount of stores.

This result corroborates the opinion of other bee-keepers in this section who have had best results from wintering bees on artificial stores alone. However, the experiment will be repeated in order to endeavour to get more conclusive results.

EXPERIMENTAL STATION, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. SAXBY BLAIR.

Four colonies of black bees in 8-frame hives were wintered outside by giving to each a protection of four inches of planer-mill shavings, which were filled in between the hive and a casing four inches larger all round than the hive, and to a depth of eight inches over the top of the hive. To keep the shavings dry there was a water-tight cover in which openings were left for ventilation.

The hives weighed, when put into winter quarters, and when removed, as follows:

Colony.	December 13, 1913. Weight of Hive.	April 13, 1914. Weight of Hive.		
	Ъb.	Lb.		
No. 1 No. 2 No. 3 No. 4	51	- 56 48 41 51		

When examined in the spring the colonies were only fairly strong, but had a considerable quantity of stores. Toward the middle of May, No. 3 hive was given some sugar syrup, but otherwise no feeding was done.

We had an increase of four swarms. Two weak swarms were, on July 31, united with the two weak and queenless colonies, which left us six fairly strong colonies for wintering.

The season was not very favourable for honey, owing to the clover plants having been killed out almost entirely the previous winter. The honey gathered was principally from wild radish, goldenrod and fireweed. Thirty pounds was the most extracted from one hive. The total product was 135 pounds of extracted honey.

The six colonies were wintered outside in cases. In place of using one case to a hive as last winter, two hives were placed together in one case with a space of two inches around the sides for planer shavings. The top was protected with 8 inches of shavings. Openings were left in the cover for air. An examination on April 13 indicated that the colonies had passed the winter in good condition.

	Weight Nov. 6, 1914.	Weight April 13, 1915.	Condition April 13, 1915.						
Colony No. 1	Lb. 68 70 63½ 66 65½ 68	Lb. 50 51½ 46 44½ 48 54	Bees covered 6½ combs. Bees covered 5½ combs. Bees covered 5 combs. Bees covered 5 combs. Bees covered 5½ combs. Bees covered 5½ combs. Bees covered 5 combs. Brood in all stages.						

EXPERIMENTAL STATION, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

On June 9, 1914, an apiary was started with five colonies of black bees in 8-frame Langstroth hives. The season was cold and backward, consequently, they did not do as well as might be expected in a normal season.

No. 4 threw a swarm on July 20 and No. 5 on July 28. The swarms were hived in 8-frame Langstroth hives. On September 9 their queens were destroyed and a day later

imported Italian queens were successfully introduced by the smoke method.

An observation hive was fitted up with a comb containing brood in all stages covered with bees, one shallow frame three-quarters filled and three sections in various stages. This was sent, together with sample bottles of honey, to the Dominion Experimental Farms Exhibit at the St. John Exhibition held in September and, from the number of inquiries made as to the cost of starting one or two hives and the methods of management, it would seem to have fulfilled a useful purpose.

The principal honey plants in this district are dandelion, wild raspberry, alsike,

fireweed, buckwheat, goldenrod and aster.

The total production of honey for the season was 147 pounds extracted honey and 59 sections.

Two winter cases to hold four hives each were constructed in accordance with Mr. Sladen's directions, and the seven colonies were put into these on November 11 and snugly packed with planer shavings. The cases were protected on three sides by a close board wind screen.

On November 11 the hives were put into the winter cases, each having plenty of stores for consumption during the winter.

An examination of the hives on April 15 showed that the bees had come through the winter in excellent condition, with the exception of those in hive No. 3 which were queenless and nearly all dead. Breeding was fairly advanced, brood in all stages being found in each of the six hives.

The following table shows the results obtained:-

Hive.	Extracted Honey.	Comb Honey in 1 pound sections.	Weight of hives April 15	Bees covered April 15.					
No. 1 1 2 11 3 11 4 11 6* 11 7*	Lb. 66 20 31 12 18	23 24 12	55 · 0 49 · 0	6 frames. 4 u Queenless and nearly all dead. 5 frames. 4 u 5 u 5 u					

Nos. 6 and 7 were late swarms.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIÈRE, QUE.

REPORT OF THE SUPERINTENDENT, JOS. BEGIN.

Six colonies of the black bee of the country were acquired in June, 1913, to start the apiary at this Station. Seven natural swarms from these gave us thirteen good colonies for wintering. They were placed in a dry, well-ventilated cellar on November 20, and were brought out on April 20, 1914, when it was found that twelve had wintered very well and one was weak.

May was a favourable month for the bees, but vegetation was so backward that the willows were not in flower until the first of the month and they remained in bloom until the fifteenth. Dandelion was in flower on June 2, but from this date the weather became cold and rainy and remained so until nearly the end of the month; consequently, the bees gathered no surplus honey in the early part of the season. During the last days of June the fine weather returned and the bees worked actively on the wild flowers on the northern slopes of the mountains. A flow of very good honey from alsike clover followed. The alsike lasted only from June 28 to July 18. A drought, which proved very disastrous to honey-producing plants, began at the end of June and continued until the end of August. In consequence of this drought buckwheat produced only very little honey and remained in flower but a short time.

The twenty-four colonies of which our apiary consisted on June 20 gave us thirteen first swarms and eleven second swarms. Besides these, eight artificial swarms were made. Eight colonies were united to make all strong for wintering. The honey crop amounted to 364 pounds of extracted honey and 108 sections. The honey was of the best quality, the colour being white and the flavour particularly fine. The average price obtained was 20 cents per pound. The greatest yield from a single colony was 68 pounds, the smallest 14 pounds.

Forty colonies were put into winter quarters in the cellar, and four were left in the apiary and placed in a wooden case consisting of tongued and grooved boards in the form of portable panels hooked together so that they could be removed and stored in a shed for the season. Three inches of oat chaff were placed between the hives and the panels and also underneath, and nine inches of the same material were placed in bags on top of the hives under the cover.

The average temperature of the bee-cellar during winter was 43° F. but, unfortunately, a heavy rain in January flooded the cellar with twelve inches of water, and the temperature fell to 33° F. The water disappeared in twenty-four-hours, but the cellar remained cold and damp and the bees became uneasy. Additional ventilation was immediately given and conditions soon became normal again, so that it is thought that the bees did not suffer much from this accident. The winter was rather mild and the bees outside flew freely for a short while on January 7 in a temperature of 47.4° F.

The bees were removed from the cellar on April 14, 1915. The hives showed an average loss of weight during the winter of 16½ pounds each. Those wintered out-of-doors showed an average loss of 10½ pounds. The first examination of the colonies was made on May 8-10. Of those wintered in the cellar 80 per cent were in good condition with two to four frames of brood, 15 per cent in fair condition with a little brood and 5 per cent weak, without brood. The four colonies wintered outside were all in good condition with brood in three to five frames.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, GUS. A. LANGELIER.

Races kept.—Two races of bees are kept at this Station, Blacks and Italians.

Hives.—The hives used are all 10-frame Langstroth.

Bee-cellar.—The cellar is under the Superintendent's house. It is 19 feet 8 inches long by 9 feet 6 inches wide and 6 feet high. The floor is of concrete, the walls and ceiling are double with a three-inch space filled with shavings. The ventilation is of the Rutherford type. The temperature ranged from 41° to 52° F. in 1913-14, and from 38° to 56° in 1914-15. Three thermometers, at the ceiling, half way down and near the floor, showed a difference of from 2° to 3°. There are no mice in the cellar.

Wintering results 1913-14.—On November 10, 1913, after three days of mild weather, eleven colonies of common black bees, all in excellent condition, were placed in the cellar. The average weight per hive was 74-66 pounds and they ranged from 67-5 to 83-5 pounds. When taken out of the cellar on April 29 the eleven colonies seemed to be in excellent condition with the exception of one which was affected with dysentery. After uniting there were nine left. The average weight when taken out was 62-01 pounds, a loss during the winter of 12-65 pounds.

Honey produced in 1914.—The total production of honey was 334 pounds and the average per colony, spring count, was 37 pounds. The greatest yield from a single colony was 72 pounds.

Wintering results, 1914-15.—On November 14, 1914, sixteen colonies, three of Blacks and thirteen of Italians, were placed in the cellar. The average weight per hive was 63-6 pounds and they ranged from 56 to 76 pounds. Fifteen colonies were taken out alive on April 21. The average weight was 46 pounds, a loss of 17-6 pounds during the winter. The average number of combs covered by bees on April 26 was 41.

Colour and flavour of honey.—A sample of honey was sent to the Apiarist, Central Experimental Farm, Ottawa, on November 4, 1914, and Mr. Sladen reported as follows: "The colour is rather too dark and the flavour too pronounced for pure clover honey. In all probability it is clover honey with a small admixture of honey from various plants growing in the swamp near the Station. The flavour is quite pleasant and attractive and the honey is of good consistency."

Bee pasturage.—Bee pasturage is limited because the Station is situated on the banks of the St. Lawrence river which is nearly two miles wide at that spot, so that the territory covered is only half of what it should be. White clover is not sown by anybody near the farm. It grows wild along roads and on waste lands and we are now putting in two pounds per acre in all mixtures; the first flowers in 1914 appeared about June 15. Alsike clover is sown each year on the farm and is an important factor in the yield of honey; it generally comes in bloom about ten days after white clover. Dandelion grows in profusion in the district surrounding the Station and generally flowers from May 20 to June 25. About a couple of acres of buckwheat will be grown each year, beginning with 1915.

Investigations.—During the winter of 1913-14 we had in the cellar five hives with the covers on, raised about one-eighth inch at one end, and six hives over which, instead of covers, there were four layers of coarse sacking. The average loss in weight during winter for the five hives with covers was 12.5 pounds, whilst it was 12.79 pounds for the six where the coarse sacking replaced the covers. It is evident that, under these circumstances, and for that winter, there was no difference between the two ways of covering the hives.

The same experiment was tried during the winter of 1914-15. Eleven hives with the ordinary covers on lost, on an average, 19.8 pounds, while the five with the coarse sacking lost 21.6 pounds. There did not seem to be any difference, just as in 1913-14.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

The season of 1914 was started with fifteen colonies in 8-frame hives which were taken from the basement of the Superintendent's residence on April 13. Twenty had been put away for the winter but five of these died, probably from lack of stores. The average weight, on November 1, 1913, of the five that died was 38 pounds, and of those that lived 47 pounds.

The chief object of this season's work was increasing the number of colonies. For this purpose ten of the colonies were used. Two colonies were sent to Lacombe early in the spring and two were reserved for honey production. One colony gave

neither increase nor surplus honey.

The increase amounted to an average of two from each of the colonies worked for that purpose. The two colonies gathering honey also gave one swarm each, bringing the total to thirty-five. Three colonies were shipped during the summer. One swarm was lost. A colony that had been used for exhibition purposes was united with another for the winter, so that thirty colonies remained for wintering.

The two hives utilized for honey production did as follows: one gave 48 pounds surplus of extracted honey valued at 16 cents per pound, or \$7.68; the other gave 26 pounds of comb honey at 20 cents, and 14 pounds of extracted honey at 16 cents, total \$7.44.

The profit and loss account of the apiary was, therefore, as follows, the value of the hives not being included:—

April	13 - 15	colonies	at	\$5.00	each	١	 	 	 			\$	75.00
Nov.	1-30		19	5.00	22			 		\$150	.00		
	5	u solo	1 11	5.00	11		 	 	 	 25	00,6		
		oney sold											
		lowing a											37.50
		deprecia											3.75
		st of suga											
		ofit											70.87
										\$190	.12	\$1	90.12

The average weight of the hives on September 17 was 51.7 pounds and on November 12, 44 pounds.

Twenty-six colonies were placed in the cellar on November 12. When removed on April 8, 1915, all were found to be alive, although many dead bees were on the floor of the cellar.

Four colonies were wintered outside in a location sheltered from wind by trees in a specially constructed case to hold the four hives, with interspaces filled with cut straw. The average weight of these four hives on November 12 was 43 pounds, rather too light for safe wintering. Two of these colonies, including the lightest, weighing 36 pounds, died in the winter. The third was quite strong in the spring and the fourth weak.

Sixty-five pounds of syrup was fed at the end of September to those colonies requiring it. The syrup was composed of 40 pounds of sugar and 25 pounds of water, and cost 4-6 cents per pound.

PLATE LXXIV



Cover.

Extracting Super.

Queen Excluder.

10-frame Brood Chamber.

Floor.

Stand.

10-frame Langstroth Hive as used at Central Experimental Farm.



Wintering Bees out of doors at the Central Experimental Farm. Each case contains four hives, packed in shavings.





Ste. Anne de la Pocatière. Apiary.



Agassiz. Apiary.







EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE SUPERINTENDENT, T. J. HARRISON, B.S.A.

During the summer of 1914 a start was made to build up an apiary at the Indian Head Experimental Station. Two colonies of bees were received on June 30 from Brandon. These were examined on July 2 and worker brood in all stages was found. In some of the frames the honey was capped. The colonies were both in good condition. On July 13 the hives were again examined and queen-cells were found. The queen-cells were destroyed and supers added. The brood chambers at this time were well filled with brood and honey. On September 15 the supers were taken off, there being no honey in any of them. Miller feeders were substituted, colony No. 1 getting fifteen pounds of syrup and colony No. 2 getting twenty pounds of syrup. On October 12 the feeders were taken off and the hives weighed. No. 1 weighed 60 pounds and No. 2, 68 pounds. On this date outer covers for the hives were made and put on.

The bees were put into the cellar on November 12. The bee-cellar was made by boarding up a small corner about six feet by ten feet in the cellar of the Superintendent's residence: a bench was built in on one side and a portion of it large enough to take the two hives was then screened in with wire mosquito netting to keep out the mice. A record was kept of the temperature in the cellar throughout the winter, the maximum temperature being 52°. F. and the minimum temperature 38° F.

The colonies were taken out of the cellar and placed on their summer stands on March 22, an outer cover being placed over each for spring protection. No. 1 colony weighed 40 pounds and No. 2, 45 pounds. The bees came through the winter in good condition.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

Apiculture has never received much attention by residents in Southern Alberta, but it would appear that it would be worthy of more consideration, especially in the

irrigated districts where alfalfa is being grown at all extensively.

Up to the present time but little apicultural work has been done at this Station. Two colonies of bees were on hand in the spring of 1914. They had been wintered in a root cellar, the conditions in which were not very satisfactory. The ventilation was poor, the air damp, and in the spring contaminated with the odour of decaying vegetables. On April 1 the hives were weighed and taken to a sheltered part of the garden. This shelter consisted of a row of cottonwood trees about fourteen feet in height. No. 1 hive weighed 40 pounds. No. 2 hive weighed 35 pounds. The weather at this time was somewhat windy, but was otherwise favourable, it being clear and with plenty of sunshine. Hive No. 1 appeared to be strong, and the bees started to work well, while hive No. 2 seemed weak and listless. A thorough examination was made in June, and No. 2 hive was found to be queenless, which was undoubtedly the reason for its inactivity. Two frames of brood containing young larvae were taken from No. 1 hive and placed in No. 2. From this brood a queen was reared and duly became fertilised.

Alfalfa, the chief source of honey, commenced to bloom the middle of June and continued until September. Wild flowers are not numerous.

During the season honey was extracted from No. 1 hive as follows:-

	Pounds.
July 25	46
August 28	44
September 23	10
Total for season	100

It was considered inadvisable to extract any honey from No. 2 hive.

Unfortunately, on August 25 a swarm of bees from No. 1 hive was lost. The final inspection made on September 24 showed that both colonies had queens and that their general condition was satisfactory.

On November 17, 1914, the hives were weighed and put in the cellar. No. 1 hive weighed 72 pounds and No. 2 weighed 65 pounds. The cellar in which the hives were put for winter was a 12ft. x 12ft. dugout, clean, and ventilated by two four-inch tile pipes in the roof so that the temperature remained fairly even at approximately 40.0° F. They appeared to winter well in these quarters. On March 31, 1915, the weight of the hives were: hive No. 1, 57 pounds; hive No. 2, 50 pounds. The general condition of both colonies was much more satisfactory than was the case the previous spring. Both had queens.

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

The bees at this Station died in the winter of 1913-14, owing probably to the dampness in the root cellar in which they were wintered. Two new colonies were received from the Experimental Farm, Brandon, in the spring of 1914. A swarm was thrown off by one of the colonies during the summer, but was too weak and insufficiently provided with stores to survive the winter.

In 1914-15 the bees were wintered in a portion of the cellar of the office, which had direct communication with the outside air through a window covered with two thicknesses of burlap, the furnace being near enough to prevent the entrance of frost. The colonies consumed an average of 11½ pounds of honey during the winter, and both the original colonies came through strong. They were moved outside on April 8. The wild crocus came into bloom on April 12, four days after the bees were moved out.

EXPERIMENTAL STATION, INVERMERE, B. C. REPORT OF THE SUPERINTENDENT, G. E. PARHAM.

Of the four colonies of bees wintered in the cellar in 1913-14, two survived and were placed in the open early in April. Of the two wintered outside, one survived. Early in July two of the hives were making progress, but the remaining one was found to be queenless, and was re-queened with a queen obtained from a neighbour's apiary.

No swarms were obtained and, either through mismanagement or unfavourable season, only ten pounds of honey were extracted. In September twenty pounds of sugar-syrup were supplied to the bees to make up the required weight of winter stores, and all the colonies went in winter quarters with adequate supplies. One hive was wintered in the cellar, and two outside, in a case packed with shavings.

The colonies were examined in March when the queens in each colony were seen. One of those wintered outside was found to be in a strong condition, the other weak. The one taken from the cellar was also in a weak condition.

In March a new man was engaged to take charge of the poultry and bees, and brought with him a supply of bees which he had successfully reared in the vicinity of Cranbrook, B.C.

These bees are in a strong condition, and the weather conditions being favourable, they immediately began collecting nectar and pollen from the willows. The apiary has now been moved to a more sheltered part of the Station, and it is hoped that the new conditions will be more favourable for bee work.

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

This section of the work on the Farm has been for the past year in the charge of Mr. V. Kuhn, who looked after the apiary in the time which he could spare from his regular work with the poultry, and as a result the bees have improved in general condition and have given decidedly better returns.

In the autumn of 1913 the ten hives of bees were set close together on a plank stand, about three inches above the ground. They were covered on three sides with roofing-felt to protect them against dampness; and the front facing south was left open. They were wintered in the open, on the south side of an evergreen windbreak.

In the spring of 1914, the bees in seven out of the ten hives were alive, although short of stores; three having apparently starved to death. In the early spring they were fed with thin sugar syrup. During the summer one colony cast a swarm, which was hived, and another evidently became queenless for the bees combined with a stronger colony, leaving plenty of stores behind them.

The seven colonies produced 375 pounds of extracted honey, making an average of slightly over 53.5 pounds per hive. The best colony gave 90 pounds, while the least productive managed to gather about 35 pounds of stores, just enough to carry them over the winter. The chief sources of the honey for the year were: white and alsike clover, fireweed, maple and goldenrod. The honey was of good quality and a medium amber colour. It was prepared for sale in 5-pound tin containers.

A hive was kept on scales during the month of July and the daily increase in weight checked, in an attempt to measure the daily flow of honey. The greatest

increase in weight for one day was 8 pounds, recorded on July 12.

Seven colonies with a good supply of food were prepared for the winter of 1914-15. Each hive was encased in a close fitting wooden cover with a pad of sacks, three inches thick, on the top of the frames, the whole being covered with a galvanized iron lid. Until January 26 they were kept on the south side of an evergreen hedge, but on that date they were removed into the new bee-yard in an open field, and placed on individual stands, as may be seen in the accompanying illustration.

The covers were left on till March 8, 1915. When these were removed the colonies were found to be in excellent condition; there was an average of two and one-half frames of stores to each hive, bees in every space, and brood in all stages, with the exception of one colony which was apparently queenless. This particular colony was re-queened with an Italian queen in September, but the queen died before being liberated; another was put in later and accepted, but she was apparently killed during the winter. In the spring the bees from this colony united with another colony, leaving two full frames of honey behind them. Four other Italian queens were introduced during September. At the time of writing the six hives have all had supers added to them and are full of bees. The illustration shows the condition of the six hives on March 31, 1915.

During the summer a small bee-house was erected for the storing of supplies and extracting of honey.

EXPERIMENTAL STATION, SIDNEY, B.C.

REPORT OF THE SUPERINTENDENT, LIONEL STEVENSON, B.S.A., M.S.

During the first week in March, 1914, ten colonies of hybrid Italian bees in 8-frame hives were bought from a local farmer. They were found to be in good condition when examined two weeks later. Five of the colonies were supered with sections for comb honey production, and five with extracting supers. In June and July seven swarms came off the colonies supered with sections, and only nine sections were completed.

The colonies devoted to extracted honey production gave only one swarm and yielded 285 pounds of honey, the largest amount produced by a single colony being 92 pounds 4 ounces. The honey was of very fine quality and sold readily in small quantities in glass jars at 25 cents per pound.

The apiary is situated within half a mile of the sea and partly surrounded by

large tracts of forest, giving the bees but a small area for foraging over.

The principal sources of honey are white Dutch clover and fireweed. In the autumn the number of colonies was reduced to twelve by uniting the weak ones, and they were fed with syrup to bring the weight of each hive up to about sixty pounds.

The only winter protection given was a chaff cushion about two inches thick placed over the quilt in a six inch bottomless box which telescoped over the upper part of the brood chamber to the depth of about an inch and was covered with a waterproof and ventilated roof. All the colonies were wintered in the open with their entrances contracted to five inches. They all survived the winter, but they were not very strong and built up rather slowly in the spring, the situation of the apiary being somewhat exposed.

The willows around the hives were in full bloom on March 12, 1915, and by the 27th the fields and roadsides were a golden glow of dandelions from which the bees

gathered pollen and nectar.

DOMINION OF CANADA DEPARTMENT OF AGRICULTURE DOMINION EXPERIMENTAL FARMS

REPORT

FROM THE

DIVISION OF FORAGE PLANTS

For the Year ending March 31, 1915

PREPARED BY

he Dominion Agrostologist, Central Farm, Ottawa	M. O. Malte, Ph.D.
uperintendent-	
Experimental Station, Charlottetown, P.E.I	J. A. Clark, B.S.A.
Experimental Farm, Nappan, N.S	W. W. Baird, B.S.A.
Experimental Station, Kentville, N.S	
Experimental Station, Fredericton, N.B	
Experimental Station, Ste. Anne de la Pocatière, Que.	Joseph Bégin.
Experimental Station, Cap Rouge, Que	G. A. Langelier.
Experimental Farm, Brandon, Man	W. C. McKillican, B.S.A.
Experimental Farm, Indian Head, Sask	T. J. Harrison, B.S.A.
Experimental Station, Rosthern, Sask	Wm. A. Munro, B.A., B.S.A.
Experimental Station, Scott, Sask	M. J. Tinline, B.S.A. (Acting).
Experimental Station, Lethbridge, Alta	W. H. Fairfield, M.S.
Experimental Station, Lacombe, Alta	G. H. Hutton, B.S.A.
Experimental Farm, Agassiz, Alta	P. H. Moore, B.S.A.
eperimentalist, Substation at Fort Vermilion, Alta	Robert Jones.



REPORT FROM THE DIVISION OF FORAGE PLANTS

OTTAWA, March 31, 1915.

J. H. GRISDALE, B. Agr.,
Director, Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith the third annual report of the Division of Forage Plants for the year ending March 31, 1915.

Included will be found reports from the Experimental Farms and Stations on which work with forage plants is undertaken, and also a brief report from the substation at Fort Vermilion, Alta.

During the year, the breeding work with grasses and leguminous forage plants, started in 1912 and 1913 respectively, has been progressing very satisfactorily. Although, on account of the very nature of the breeding work referred to, final results have not yet been obtained, it may be stated that the breeding work so far conducted promises to lead to results which will prove of great importance to agriculture in Canada.

In addition to the ordinary work with field roots, consisting chiefly of variety tests, preliminary work has been started with the object of improving, by breeding, the most prominent varieties now obtainable commercially.

Steps have also been taken to secure data bearing on the possibility of raising seed of field roots profitably in Canada, especially in the eastern provinces.

Owing to the fact that I had to spend almost the whole summer in Western Canada, preparing a collection of grasses for the Canadian Exhibit at the Panama-Pacific Exposition, San Francisco, Cal., practically all the work with forage plants carried out at the Central Experimental Farm during the summer was directed and led by my Assistant, Mr. F. S. Browne, B.S.A. I am greatly indebted to Mr. Browne for his most able and competent work.

I have the honour to be, sir,
Your obedient servant,

M. O. MALTE,
Dominion Agrostologist.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

REPORT OF THE DOMINION AGROSTOLOGIST-M. O. MALTE, Ph.D.

INDÍAN CORN.

Variety tests with Indian corn were again conducted with the object of ascertaining the comparative value of different varieties for the Ottawa district.

The land used for the experiment was in hood crop in 1913, and had, that year, been well manured and limed. It was ploughed in the spring of 1914 and afterwards disced and drag harrowed. No manure was applied.

Twelve varieties were tested, each variety being grown in duplicate plots, oneone hundredth of an acre in size. The seed was sown on May 29, in hills three feet apart each way. All varieties were harvested on September 13.

Of the twelve varieties tested, four produced a comparatively large number of well ripened ears. These varieties are all low yielding as far as the tonnage of ensilage is concerned, and can therefore not be recommended as ensilage varieties for districts in which, normally, higher yielding varieties reach the proper ensilage stage. In such districts they may, however, be profitably grown for grain.

On account of their rapid growth they are able to reach a stage of maturity sufficiently advanced for making good ensilage comparatively far north, and may therefore to grown to advantage in districts where other varieties fail to produce ensilage of desirable quality.

The varieties referred to are Quebec Yellow, Windus Yellow Dent, Canada Yellow and Free Press. Their yield of ripe ears is indicated by the following table. In computing the yields, 72 pounds of husked crib-dried cebs was taken as the weight per bushel.

INDIAN CORN, Harvested for Grain.

No.	Variety.	Condition when cut.					Average Yield per acre.	
2 3	Quebec Yellow	Late dough to ripe	88 57	Lb. 40 10 10 60	Bush. 111 103 78 51 86	Lb. 30 40 40 30 17	Bush, 99 80 77 47	Lb: 71 25 61 .9

Of the eight remaining varieties, i.e., the ensilage varieties proper, the Argentine Yellow, as will be seen from the following table, was the heaviest producer. This is a southern variety which has not been tested at Ottawa before. Although a heavy yielder, it may, in reality, be inferior to other varieties as an ensilage corn. It only reached the milk stage and consequently gave an ensilage containing less milk and flesh forming units to the acre than other more alvanced but less yielding varieties.

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In the following table are given the yields of the varieties harvested for ensilage:

INDIAN CORN for Ensilage—Test of Varieties.

No.	Variety.	Condition when cut.	Hei	ght.	Yield p	plot		er acre.	Average Yield per acre.	
2 3 4 5 6 7	Argentine Yellow White Cap Yellow Dent. Golden Glow King Philip. Wisconsin No. 7 Bailey Longfellow. Salzer's North Dakota. Average.	Early dough. Late milk to dough. Med. dough. Early dough.	Ft. 10 9 9 9 9 8 8 8	In. 0 6 8 6 6 4	19 19 19 19	Lb. 00 1,000 00 1,400 1,000 00 200 1,400 375	16 16	Lb. 200 1,000 700 700 200 1,700 300 800 1,950	Ton. 20 20 19 18 18 17 15 14	Lb. 100 00 1,350 1,050 600 1,850 1,250 1,100

FIELD ROOTS.

VARIETY TESTS.

During the year, the usual comparative tests with different varieties of field roots were conducted. Several varieties which previous experiments have found below the average standard were eliminated this year. On the other hand a number of new varieties, chiefly of European origin, were subjected to comparative tests. Not less than 66 varieties were grown, including 30 varieties of turnips, 24 varieties of mangels, 8 varieties of carrots and 4 varieties of sugar beets.

The land allotted to the experiments was a medium loam, upon which roots and corn had been grown the previous season. It was therefore in a good state of tilth and as it ind been well manured and limed for the preceding crop, no fertilizer was used. After ploughing during the late fall of 1913, the soil was worked up well with a heavy disc-harrow followed by a drag in the spring of 1914. Before planting, the land was ridged up into low drills which were worked down with a hand rake. Later they were further flattened by the roller on the seeder.

Mangels, carrots and sugar beets were sown on May 12 and thinned June 4 to 6, while turnips were sown June 1 and thinned June 20 to 22. During the season the land was hand-hoed once, wheel-hoed three times and cultivated with a horse cultivator four times. Mangels were harvested October 14 to 16, sugar beets October 15, carrots November 3 and turnips November 3 to 6.

TURNIPS.

Eighteen varieties of turnips were tested in duplicate plots.

At the time of planting, the weather was hot and dry, but in spite of this, the seed germinated well. All varieties made a good start and the growth was quite satisfactory up to the end of August. Unfortunately, the prospects of a heavy crop, so promising in the early part of the summer, were considerably reduced during the latter part of the season, inasmuch as the growth of the crop was somewhat checked through a severe attack of a fungous disease.

The disease referred to -caused by a *Phoma* species—attacks the crown of the roots and also the roots themselves. The first perceptible sign of it is the withering of the leaves, the result consequently being that the growth of the roots is either stopped

or more or less checked. Decay of the crown of the roots is also caused, opening the way for numerous other putrefactive organisms. In severe cases, the *Phoma* attack results in the loss of the entire root.

The varieties which suffered the severest shock from the disease were Corning's Lapland, Kangaroo, Skirving's and Jumbo. Very little injury was recorded in Canadian Gem, Hartley's Bronze Top, Hall's Westbury, Magnum Bonum, Empress and Durham.

TURNIPS .- Test of Varieties.

No.	Variety.	YIELD PER ACRE.										Dry Matter per
		1st Plot.			2nd Plot.				Aver	age.	Dry Mat- ter.	Acre.
		Ton	. Lb.	Bu. Lb.	Ton	. Lb.	Bu. Lb.	Ton	Lb.	Bu. Lb.		Ton. Lb.
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	Canadian Gem Hartley's Bronze Top. Hall's Westbury Empress Durham Corning's Lapland Magnum Bonum Good Luck Halewood's Bronze Top New Century Jumbo Bangholm Kangaroo Best of all Perfection Hazard's Improved Skirving's Mammoth Clyde	26 31 27 28 27 26 26 25 26 21 25 22 28 18 26 22	1,300 1,800 400 00 1,500 200 500 100 1,700 00 1,600 00 1,600 400 1,000	1,033 20 930 00 930 00 940 00 900 00 891 40 870 00 881 40 868 26 711 40 868 20 626 40 873 20 626 40 873 20 750 00	26 23 22 26 27 23 23 25 23 24 22 20 18 26 22 22 21 20	400 1,600 00 1,300 1,600 00 800 300 1,200 600 1,100 1,300 1,500 1,500 1,600	793 20 733 20 888 20 921 40 793 20 766 40 820 00 771 40 820 00 685 00 621 40 750 00 750 00 750 20 693 20	24 22 22 25 25 20 23 21	850 800 1,900 850 650 550 1,10c 650 1,200 1,95c 1300 1,956 500 1,556 1,800 1,806	913 20 831 40 914 110 910 56 842 36 818 20 765 56 802 36 742 36 755 00 755 00 865 56 861 46 692 36 796 40 721 46	10 14 11 00 9 990 10 70 10 10 80 10 10 10 10 20 11 00 9 900 10 66 10 36 9 900 9 900 900	2 1,556-7 2 1,489-0 2 1,480-1 2 1,410-3 2 1,410-3 2 1,115-6 2 1,018-4 2 834-5 2 769-0 2 693-0 2 675-5 2 646-0 2 487-4 2 483-6 2 304-0
	Average	25	1,561	859 21	23	839	780 39	24	1,200	820 00		2 1,004 4

In addition to the varieties, tabulated above, a number of varieties, obtained from Sweden and Denmark, were also tested. Only small samples of seed were available and, as a consequence, each variety was grown in a single plot.

The results, as given below, indicate that the varieties in question proved inferior to the American varieties. Although, of course, their seeming inferiority can not be considered positively proven from one year's tests, it seems that they are not as well adapted to the hot summer climate of the Ottawa district as are the American varieties. The hot weather caused the leaves to wither down prematurely, the result being that the top did not reach its full growth. The small top of the Swedish and Danish varieties was a very conspicuous character, strongly contrasting with the strong top of the American ones.

TURNIPS .- Test of Varieties.

No.	Variety.	Y	IELD P	ER ACE	E	Per cent. Dry Matter.	M	Dry latter Acre.
1 2 3 4 5	Swedish Varieties— Weibull's Ostersundom (swede) Pedigree Bortfelder (fall) Svensk Stat (fall) Bangholm (swede) Sekel (fall) Average	Ton. 20 21 18 15 16	Lb. 1,400 1,600 500 600 800	Bush. 690 726 608 510 546	Lb. 00 40 20 90 40	10·2 7·8 8·4 9·6 7~4	Ton. 2 1 1 1 1	222 · 8 1,400 · 8 1,066 · 0 937 · 6 427 · 2
1 2 3 4 5 6 7	Danish Varieties— Paibjerg Bangholm (swede) Shephend's Golden Globe (swede) Danish Yellow Tankard (fall). Oslgaard Bangholm Short Nick (swede). Dale's Hybrid (fall). Fynsk Bortfelder (fall). Greystone (fall). Average	20 19 20 16 19 19 12	800 400 00 00 900 900 400	680 640 666 533 648 648 406	00 00 40 20 20 20 40	10 · 00 10 · 00 8 · 30 10 · 18 8 · 20 8 · 20 8 · 50	2 1 1 1 1 1 1 1 1 1 1	80 0 1,840 0 1,320 0 1,257 6 1,189 8 1,189 8 74 0

MANGELS.

The early seeding and the good germination ensured a good stand in the early part of the summer. Up to the middle of July the growth was very satisfactory. The prolonged hot and dry weather in the middle of the summer, however, caused considerable tip burn, and as a result the growth was somewhat checked.

The tip burn influenced the growth of different varieties in a markedly different way. Varieties with a small top, such as Globes and Tankards, practically ceased growth when badly attacked. Heavier topped varieties, such as Giant Half Sugar White and many of the Long Red and Yellow Intermediate varieties, were less seriously attacked and also, when affected, seemed to recuperate more easily after the cessation of the dry period.

The following table gives the yields of thirteen varieties grown in duplicate plots:—

Mangels .- Test of Varieties.

No.	Variety.				7	YIE	LD PE	R Ac	RE.					Per cent Dry		Dry Aatter
_			1st	Plot.		_	2nd	Plot.		1	Ave	rage		Mat- ter.	_ 4	Acre.
		Tor	n.Lb.	Bu.	Lb.	To	n.Lb.	Bu.	Lb.	To	n Lb.	Bu.	Lb.		To	n. Lb.
2 3 4 5 6	Giant Yellow Intermediate. Gate Post Improved Manmoth Saw-log Mammoth Yellow Interme- diate. Prize Manmoth Long Rest. Manmoth Long Rest.	18 22 23 22 21 18 17	300 1,400 1,200	605 756 786 756 701 613 575	40 40 40 40 40 20 00	23 3) 29 22 24 31 25 23 26	1,300 600 700	1,010 988 743 811 1,048 863 766	20 20 40 20 20 40	24 26 22 23 26 22 20	450 350 1,900 1,050 500 300 250		30 30 00 10 00 20 50	14:40 14:01 12:44 13:60	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	1,714 · 2 986 · 5 826 · 4 609 · 6 695 · 8 531 · 0 24 · 8 1,908 · 7 1,765 · 7
10 11 12	Perfection Mammoth Long Red	18 21 20 20	1,800 100 900 700	630 701 681 678	00	23 21 24 24	1,700 1,000 700 100 885	795 716 811 801	00 40 40 40	21 21 22		712 709 746 740	30 10 40	12·52 12·54 11·68 11·16	2 2	1,352·3 1,335 7 1,232 6

A number of varieties from Sweden and Denmark were tested in single plots, the small quantity of seed available making it impossible to sow two plots of each variety.

The results, as given below, indicate a slight general inferiority of the varieties as compared with the American varieties recorded above.

One of the Danish varieties, viz.: Elvetham Mammoth, proved far superior to all the other ones. The Elvetham Mammoth has a much larger top than any other of the varieties tested and this may account for its heavier yield. That this explanation is reasonable seems to be borne out by the general experience, gained this summer, that such varieties of both mangels and turnips which were characterized by heavy top, were much less influenced by the hot and dry summer than those possessing a small top.

Mangels.—Test of Varieties.

No.	Variety.		Yield p	er acre		Per cent Dry Matter.		7 Matter er acre.
	Danish varieties—	Ton.	Ĺb.	Bush.	Lb.	,	Tor	ı. Lb.
1	Elvetham Manmoth	28	1,800	963	20	12.30	3	1,009:4
2	Taaroje Barres. Danish Eckendorffer Rod.	22	00	733	20	13.70	3	28 (
3	Danish Eckendorffer Rod	25	200	836	40	11.00	2	1,522 (
4	Danish Eckendorffer Gul	24	800	813	20	11.00	2	1,3681
5	Sludstrup Barres	16	1,600	560	00	12.06	2	52.1
	Average	23	889	781	20		2	1,595 9
	Swedish varieties—							
1	Weibull's Barres Rodgul	23	200	770	00	13.48	3	227 - 7
2	Weibull's Liusrod	21	800	.713	20	14.04	3	9.1
3	Weibull's Eckendorffer Rod	23	1,000	783	20	12.06	2	1.668
4	Weibull's Cylinder Barres.	22	800	746	40	. 12.44	2	1,573
5	Weibull's Eckendorffer Gul	20	1,800	696	40	10.98	2	589 (
6	Weibull's Excelsior Rod	23	. 00	766	40	9.62	2	425
1	Average.	22	767	746	7		2	1,415

CARROTS.

Five varieties of carrots were sown in duplicate plots. The seed germinated very slowly and most of the varieties had to be partly resown. In spite of this, a fair stand was obtained, and the results, as tabulated below, give a fairly comprehensive idea of the yielding power of the varieties.

CARROTS.—Test of Varieties.

No.	Variety.					Y	IELD P	ER AC	RE.					Per cent Dry	Dry
			1st :	Plot.			2n d	Plc t.		- /	Av	erage.		Mat-	per acre.
		To	n. Lb.	Bush.	Lb.	To	n. Lb.	Bush.	Lb.	Ton.	Lb.	Bush	. Lb.		Ton. Lb.
2	White Belgium Ontario Champion. Mammoth White		1,000	783 773	20 20		1,800 1,600	830 893	00 20	24 25	400 00	806 833	40 20		2 1,904 2 2 1,650
•/	Intermediate Improved Short	22	1,100	751	40	25	1,200	- 853	20	24	150	802	30	10.90	2 1,248
	White	20	1,100	685	00	25	1,300	855	00	23	200	770	00	10.80	2 989
_		17	1,700	595	00	24	900	815	00	21	300	795	00	10.90	2 610 1
	Average	21	1,060	717	40	25	960	849	20	23	1,010	783	30		2 1,280

Three Danish varieties, of which only a small quantity of seed was available, were tested in single plots. The results are recorded below.

CARROTS.—Test of Varieties.

No.	Danish Varieties.		Yield p	er Acre.		Per cent Dry Matter.	Dry	Matter Acre.
2	Champion. James. Nantes Average	Ton. 29 16 10	Lb. 1,500 200 00 1,233	Bush. 991 536 333	Lb. 40 40 20	12·8 11·60 10·90	Ton. 3 1 1 2	Lb. 1,616 0 1,735 2 180 0 510 4

SUGAR BEETS.

Four varieties of sugar beets were tested in duplicate plots. The germination of the seed was satisfactory and all varieties made an even growth throughout the season. Although no variety seemed to be perceptibly affected by the hot dry weather and no tip burn was observed, the yield, which was lower than that of previous years, indicates that the sugar beets suffered somewhat from the unfavourable summer weather.

Sugar Beets.—Test of Varieties.

No.	Variety.					YIEL	D PER AC	RE.			
			1st	Plot.		2	nd Plot.		Ave	erage.	
3	Vilmorin's Improved A French Very Rich Klein Wanzle' en Vilmorin's Improved B.	Ton. 14 14 14 14 14	Lb. 500 600 00 300	Bush. 475 476 466 471 472	Lb. 00 40 40 40 40	Ton. L 14 30 13 1,80 13 30 12 1,30 13 92	0 471 0 463 0 438 0 421	Lb. 40 20 20 40 45	Ton. Lb. 14 400 14 200 13 1,150 13 . 800 13 1,637	Bush. 473 470 452 446	Lb. 20 00 30 40

COMPARATIVE VALUE OF VARIETIES OF FIELD ROOTS.

During the last two years, all variety tests, whenever practical, have been conducted in duplicates. That is to say, each variety has been tested in two plots and its yielding capacity judged from the average yield of the two plots. By the duplicate plot system the disturbing influence of soil variation on the yielding capacity of the different varieties as expressed by the tomage produced is, to a great extent, eliminated. The average yield of two plots of a variety therefore constitutes a truer expression of its real yielding power than does the yield secured from a single plot only. This is especially true on land which has been used for experiments of a varied nature during preceding years and which, for this reason, may be more or less uneven as to productive power and mechanical condition.

The value of the duplicate plot system in comparative tests has been amply proven during the two years it has been followed and this not only at the Central Experimental Farm but also at all the Branch Farms and Stations where it has been introduced.

The actual value of a variety of field roots as food for animals does, however, not only depend upon its yielding capacity as expressed in tons or bushels, but also on its feeding value as expressed by its chemical composition, *i.e.* the dry matter content produced to the acre. As the percentage of dry matter, normally found in different varieties, is varying with the variety, it follows that a certain tonnage produced by a certain variety is not necessarily equivalent in feeding value to the same tonnage produced by another variety. A few examples will make this clear.

The Giant Half Sugar White Mangel (see table on page 1021) yielded 22 tons 850 pounds to the acre, with a dry matter percentage of 17.20. The dry matter produced to the acre was 3 tons 1.714.2 pounds. The Selected Yellow Globe gave a yield of 22 tons 800 pounds or approximately the same as the Giant Half Sugar White, but as its dry matter percentage was only 11.68, the actual food harvested from an acre amounted only to 2 tons 1.232.6 pounds or about 70 per cent of that secured from

the Giant Half Sugar White variety.

Corning's Lapland and Perfection, both swede turnips (see table page 1020) yielded approximately the same, viz.: 25 tons 550 pounds and 25 tons 500 pounds respectively to the acre.

The percentage of dry matter of the former being 10.70, it produced 2 tons 1,408 pounds of dry matter to the acre, whereas the latter variety, with 9.20 per cent dry matter, produced only 2 tons 646 pounds solid food, or about 15 per cent less of actual food constituents than was produced by Corning's Lapland.

As the dry matter produced to the acre is determined by the tonnage and the percentage of dry matter characteristic of the variety, it naturally follows that a variety containing a high percentage of dry matter may actually produce more dry matter to the acre and thus furnish more food than a variety characterized by low dry matter content, in spite of the fact that the yield of the latter as expressed in tons or bushels may be considerably higher than that of the former.

For instance, the Giant Half Sugar White Mangel yielded three and three quarters ton less than the Giant Yellow Intermediate (see table page 1021) but owing to its higher percentage of dry matter, it produced about 900 pounds more dry matter to the acre than the latter variety.

The New Century Turnip yielded three tons less than the variety called Best of All, but in spite of this it produced more dry matter to the acre than the latter.

The above examples tend to show the advisability of growing field root varieties which not only are capable of producing a large tonnage to the acre but also are characterized by a high dry matter content.

Comparative value of Mangels, Turnips and Carrots, Average of all varieties grown, 1914.

No.	Crop.		Yield p	er Acre.		Dry	Matter.
2	Mangels. Carrots Turnips.	Ton. 23 21 22	Lb. 50 1,359 130	Bush. 767 722 735	Lb. 30- 39 30	Ton. 2 2 2 2	Lb. 1,847·8 975·4 336·4

GROWING FIELD ROOTS FOR SEED.

At present, practically all seed of Field Roots used in Canada is being secured from foreign countries. Only a very small amount of seed of certain varieties of mangels, turnips, carrots and sugar beets is being raised in Canada. This seed, however, can fully compete, as far as quality is concerned, with the best imported seed. As a matter of fact, the experience of the farmers engaged in seed raising tends to show that seed of a variety grown in a certain district gives a better crop of roots when sown in that district than seed of the same variety imported from somewhere else.

So far, actual data bearing on the possibilities of growing field root seed profitably in different parts of the Dominion have not been secured by the Experimental Farms. With a view of securing such data, seed roots have been selected for plant-

ing in 1915 on several of the Experimental Farms and Stations.

At Ottawa, about 12,000 roots, weighing 15 tons, were selected from the farm crop of Mammoth Long Red Mangel, to be used for seed production in 1915. Of this number, over 6,500 were stacked in the root cellar. The balance was pitted outside. The roots stored in the cellar all proved sound in the spring of 1915, whilst of the roots pitted outside a small percentage rotted.

In addition, about three tons of mangels of the Long Red and Yellow Intermediate varieties were saved from the crop grown for variety tests by the Division of

Forage Plants.

BREEDING NEW VARIETIES OF FIELD ROOTS.

Observations have been made by the Division of Forage Plants to the effect that many of the varieties of field roots most widely used in Canada, are lacking in uniformity, not only as far as the characteristics of the roots are concerned, but also as to the character of the seed produced by different individuals belonging to the same variety. The variation of individual roots belonging to the same variety as to chemical composition has also proven to be considerable. In other words, many varieties are not as uniform as they should be, and could therefore be improved by

With a view to raising new varieties superior to the old ones as to uniformity and feeding value, a number of roots of Swede turnips and mangels were selected in 1913. Owing, however, to unsatisfactory storage causing soft rots, their number was greatly reduced during the winter of 1913-14. During the year seed was obtained from 14 swedes and 7 mangels. The plants producing this seed were isolated and self-fertilized and the seed obtained harvested separately from each individual plant.

For further breeding work, 200 mangels, 250 turnips, and 60 carrots were selected from the leading varieties during the year.

LEGUMINOUS FORAGE PLANTS AND GRASSES.

ALFALFA.

. Hardiness.-The extraordinary value of alfalfa for the development of the dairy and live stock industry being universally recognized by all agricultural Canada, its growing and general use as forage is being most vigorously advocated. Many of the difficulties in growing alfalfa successfully, encountered in years past, have been gradually removed and, as a result, alfalfa has proven itself well adapted to large areas in Canada. Where the soil and moisture conditions are suitable and where the winter climate allows it to survive without injury, it yields heavier returns than any other leguminous forage crop.

In those parts of Canada where the winters are severe winter-killing may be apt to prevent its profitable growing. The extent of the winter-killing and, as a consequence, the prospects for successful alfalfa growing in a district with severe winters depend, however, very much on the variety of alfalfa used.

It has been clearly demonstrated by the numerous experiments carried out by the Experimental Farms, that partial or total failure may be encountered if a variety is used which has been originated in a southern country and which for this reason is lacking in hardiness. On the other hand, it has also been demonstrated that the danger of winter-killing is much less if a variety is used which has been originated in a country where the climatic conditions are similar to those prevailing in the district where the alfalfa is to be grown.

The explanation of these facts rests with the nature of what is termed hardiness

or ability to withstand severe winter climate.

The results of observations and experiments clearly show that hardiness is a hereditary character, that is to say that a hardy plant produces a progeny which also is hardy. When an alfalfa variety, for instance Grimm's Alfalfa or Ontario Variegated, is called hardy, it means that the variety in question is composed of hardy individuals which, when propagated by seed, give rise to plants which also are hardy. Hardiness is, however, only a relative character. That is to say that a variety which is able to stand, say a temperature of 20 below zero, is not necessarily able to survive where the temperature drops to 50 below. It may be totally or only partially winter-killed. When total winter-killing occurs, it means that one hundred per cent of the individuals within the variety are too tender. When the winter-killing is only partial, it means that a certain number of the plants are hardy to the conditions under which they have been able to survive.

The hardiness thus being a character attached to the individual plants within a variety, there is evidently a possibility of increasing the hardiness of a variety, or, in other words, to increase the percentage of hardy individuals within a variety

simply by propagation, by seed, of such individual plants as prove hardy.

In order thus to secure a perfectly hardy variety of alfalfa the Division of Forage Plante has saved seed from its alfalfa plots for some years. Part of the seed obtained has been distributed to farmers in districts where the winter conditions are far too severe for ordinary alfalfa. Reports secured from several of the farmers all agree that the alfalfa crop raised from this seed is quite satisfactory, and that the degree of hardiness is far above that of ordinary alfalfa.

That alfalfa originated from seed secured from plants able to survive severe winters, represents a variety which is hardier than ordinary alfalfa, was also demon-

strated at the Central Experimental Farm, this year.

During the summer of 1913, one thousand plants raised from seed of plants which survived the previous very unfavourable winter, were transplanted in the experimental field for breeding purposes. On account of the very dry weather in August and September, the plants made a very unsatisfactory growth and entered the winter in a rather poor condition, but, in spite of this, they stood the winter of 1913-14 unexpectedly well. Only a very few plants were lost.

Briefly, the results obtained so far, clearly indicate that the safest if not the only way to secure a perfectly hardy alfalfa is to use seed produced as far north as possible. Whenever such seed is used there is little danger of crop failure on account of winter-

killing.

Breeding for Uniformity and High Quality.—The first step in the breeding work with alfalfa is necessarily the production of a hardy variety. This accomplished, breeding for other qualities apt to raise the standard of the variety can be undertaken.

The hardiest varieties obtainable commercially at present are Grimm's and Ontario Variegated alfalfa. Both, however, are far from uniform and can therefore be OTTAWA.

improved upon in that respect. They are also somewhat inferior to pure alfalfa in quality, because they have been developed from crosses between the latter and Yellow Lucerne, a species which is much inferior to the pure alfalfa as far as quality and palatibility are concerned.

A certain percentage of plants of Grimm's and Ontario Variegated, however, have inherited the quality characters of pure alfalfa, and are, for this reason, superior to the average plants of the varieties in question. From such plants superior strains can therefore be produced.

Even pure alfalfa is far from uniform, practically any field showing a great variation of the individual plants in characters affecting the quality, yielding capacity and general value of the crop. It will therefore be possible to breed, also from pure alfalfa, strains superior to the alfalfa varieties now available.

For breeding work of the character referred to, one thousand plants were secured in 1913. During 1914, seventeen lots of plants, with a total of 570 individuals, raised from seed obtained through self-fertilization of plants having outstanding characters, were transplanted in the experimental field. In addition, eight lots having from four to thirty plants each, were-secured from seed, obtained by cross-fertilization of selected plants.

RED CLOVER.

Hardiness.—Hardiness being essential for successful red clover growing in many parts of Canada, the Division of Forage Plants started; in 1913, an experiment with the intention to demonstrate how red clover can be easily improved as to hardiness. The principle worked on for the production of hardy varieties from comparatively tender ones is essentially the same as that followed in the breeding work with alfalfa. The work is based on the well established fact that what is called a "variety" of red clover, is in reality a mixture of many different varieties or types, having not only different forage value, but also displaying different degrees of hardiness. Breeding for hardiness simply means elimination of all types which are too tender, and propagation of such types which are able to winter satisfactorily. As the elimination of the tender types is done by nature herself, the breeding work to be done by man simply consists of propagation, by seed, of all plants which are surviving after the weaker ones have been killed.

In order to obtain actual figures bearing out the truth of the above statement, nine lots of red clover were sown in 1913. Each lot was sown in two plots and also in rows. One of the plots of each variety was cut for hay, the yield obtained indicating its hay producing capacity. The second plot of each variety was allowed to go to seed. The seed thus obtained will be used in 1915 for plots laid out and handled in the same way and for the same purpose as those referred to above.

Each variety was also sown in rows for the purpose of determining the actual percentage of the plants killed during the first years.

The results will be seen from the following table. They show that the hardiness, as determined by the number of surviving plants in the rows, varies from 53.6 to 2.1 per cent, i.e., that the degree of hardiness is very different for the different lots. The figures also show that, roughly, the yields recorded from the hay plots are fairly proportionate with the percentage of hardiness as found in the corresponding rows. In other words, that the yield of a variety of red clover is, to a certain extent at least, associated with its hardiness.

RED CLOVER-Test Plots, 1914.

				Ha	y I	PLOTS	3— Y 1	IELD	PER	ACRE						SRED PLOTS	MIN	FOR I	OF
Number.	Fir	st C	uttin	g.			Sec	ond (Cutti	ng.			To	tal.		Yield per		per of I	
Plot 1	Green.	D	ry.	Date		Gre	en.	Di	y.	Dat	e.	Gre	en.	Di	ry.	Acre.	Fall 1913.	Spring 1914.	Hardy
1 3 6 4 2 5 7 8 9	7 1700 7 700 6 1300	1 1 1 1 0 0	200	16 11 51 66 15	1 22 22 22 22 22 22 22 22 22 22 22	5 5 4 5 4	Lb, 1800 300 1900 00 1700 1700 00 200 00	1 1 1 1 1 0 0	900 500 300 400 400 200 400 00	Sept. Aug.	31 31 31 31 31 31 31	13 12	Lb. 1500 1000 1200 200 1400 600 00 1000 877	3 3 3 3 2 2 2 0 0	Lb. 1100 200 200 100 1300 1300 1200 200 733	160 153 160 122 170 100 128 60	622 596 600 640 589 574 562 464 432	333 308 97 221 214 136 81 27 9	53·6 51·7 16·2 34·5 36·3 23·7 14·4 5·8 2·1

Breeding for increased yield.—With a view to the production of superior morphological strains, of known pedigree, 36 crosses were made between apparently superior plants. Fourteen of the crosses were made between plants that blossomed rather late in the season, and may be considered as capable of producing only one reliable crop of hay in a season. A variety having this characteristic would, it is thought, prove more satisfactory for mixing with timothy than the ordinary red clover which is usually nearly ripe, and of greatly reduced feeding value, when the timothy is in a proper state for hay. It should also prove very useful for districts where only one crop is possible in a season, for owing to its lateness, it would have a longer growing period than the ordinary commercial red clover.

The other twenty-two crosses were made on the second growth of plants that had produced a satisfactory first crop, and, at the time, gave evidence of producing an equally satisfactory second crop. Of the advantages of a variety having this character nothing need be said, as that is what red clover is expected to do, but which it rarely accomplishes.

For further breeding work 29 lots, numbering in all 1,000 individual plants, were transplanted to the field during the season. Each of these lots represents the progeny of a single plant which was itself a selected individual from the progeny of a single plant which grew in 1911. The final results of this breeding work have not yet been arrived at.

GRASSES.

Timothy.—In 1913, seventeen timothy plants were selected from about 1,200 individuals, planted in 1911. They were self-fertilized, and the seed thus obtained sown separately in pots. In 1914, 65 plants were secured from each of the 17 seed lots and transplanted into the field to be tested on uniformity.

As the transplanting was done during early August, the plants were not very large at the close of the season. Yet, a certain uniformity in general appearance and resistance to drought and rust was evidenced by some of the lots. Although final, i.e., perfectly uniform varieties, have not yet been secured, yet a quite conspicuous uniformity is being displayed by some of the "strains" worked on.

OTTAWA.

For further breeding work, 18 plants showing especially desirable characteristics were selected from the individuals obtained in 1913. They were isolated and self-tertilized and yielded a good quantity of seed.

Orchard Grass.—During 1913 seed was obtained by self-fertilization from several of the best plants of Orchard grass transplanted to the field in 1912. Owing to lack of space, seed from only eight of these plants could be used in 1914, and from each lot of seed only 30 plants were obtained. These eight lots were transplanted to the field during August, and for the balance of the season made a very creditable growth.

Western Rye Grass.—Three lots of 40 plants each, of Western Rye grass, were transplanted to the field during July. Each of these lots was grown from the seed of a single plant of a superior type and will next year, it is hoped, furnish material for breeding work of a nature similar to that under way with timothy and orchard grass.

Reed Fescue (Festuca arundinacea Schreb).—During 1912 attention was called by the Superintendent of the Experimental Farm, Agassiz, B.C., to a variety of fescue, said to furnish splendid forage, relished very much by cattle. The fescue in question was identified as Reed fescue, a close relative of Meadow fescue, and sometimes confused with it. A sample of seed was secured from Agassiz and sown early in the season of this year. During July, 200 young seedlings were selected and transplanted into the experimental field for further study.

Red Top.—Seed from 22 Red Top plants, showing desirable characteristics, was harvested during the past season. Individual plants will be secured next year from these seed lots and a course of breeding work similar to that adopted with other grasses followed.

BROOM CORN.

Experiments with Broom Corn similar to those reported on for 1913, were laid out in the spring of 1914. The very dry weather, however, at the time of planting delayed germination to such an extent that the crop was practically a failure and of no experimental value.

HERBARIUM.

It was reported last year that for the proper understanding of the nature of a great number of Canadian grasses and sedges, a collection of European material for comparison was found necessary.

In order to obtain such materail arrangements were made to secure, through exchange, a representative collection of grasses and sedges from Northern Europe. In accordance herewith about one thousand sheets of duplicates, belonging to the Division of Forage Plants, were sent to Europe for exchange.

So far, the Division has received, in return, about 800 sheets of European sedges and grasses.

EXHIBITION MATERIAL.

Special attention has this year been paid to the collection of grass material for exhibition purposes. Through the able co-operation of Mr. W. Herriot, Galt, Ont.; Mr. Norman Criddle; Treesbank, Man.; and F. S. Browne, B.S.A. Assistant to Dominion Agrostologist, not less than 1,400 exhibition specimens, representing over 200 species and forms have been secured. A great number of these are to be exhibited at the Panama Pacific Exhibition in San Francisco, Cal. The balance of the specimens, added by a large number of small sheaves, chiefly representing agricultural grasses, will be used for various exhibits of an educational character throughout the Dominion

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

CHARACTER OF SEASON.

The spring of 1914 was fully one week later than usual. During the winter the snow lay deep on the ground and did not disappear until the end of February. A period of extreme cold occurred in that month. The weather of March was mild but did not continue, April and the first half of May being, on the whole, very cool.

The clover, which appeared to have wintered well, remained apparently dormant throughout the spring, and made such a slow start that the grasses in many fields overshadowed it, and even the favourable showers of June failed to restore its early promise of a heavy crop. The corn germinated well but there were no hot days in June to push it forward. The frequent showers made all root seeds germinate well but they also rendered the control of weeds difficult. Haying was commenced on the 15th of July but did not become general until the first week in August. July and August were very favourable for plant growth. The corn stretched upward and the roots formed quickly. The first and third weeks in September were very hot and dry, the thermometer rising several degrees higher than at any previous time in the summer. The first frost occurred October 7th but was not severe enough to injure mangels. October was dry so that turnips, carrots and sugar beets did not make their usual heavy autumn growth.

INDIAN CORN.

A light coat of manure was applied to the land in the spring and ploughed under. After the soil had been given a thorough top working the corn was put in with the potato planter in rows three feet apart. Before planting the corn was soaked with lead arsenate which prevented the birds from doing any damage. The corn was planted June third and harvested October second. The yields were computed from one-hundredth acre plots. Of the nine varieties tested six were entirely new to this district.

INDIAN CORN FOR ENSILAGE—Test of Varieties.

No.	Name of Variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when cut.	Weight per ac
6 7 8	Early Longfellow Salzer's North Dakota King Philip Wisconsin No. 7. Canada Yellow Bailey White Cap Yellow Dent Grolden Glow Free Press Average	# 4 # 3 # 3 # 3	11 2 13 3 14 2 15 2 16 2 17 2	87 84 86 95 54 93 99 100 52	Tasselled. Late milk Early milk Tasselled. Ripe Tasselled. " " Late milk	Tons. Lb. 18 1560 18 1086 18 60 15 60 15 60 14 560 13 1960 13 1960 5 800

CHARLOTTETOWN.

FIELD ROOTS.

The chief variety tests of turnips and mangels were carried on under field conditions on Rotation F, section C, of the area set aside for cereals. The test plots of carrots and sugar beets were near the pear orchard in the Horticultural division. The cut-worms were very numerous and caused about 7 per cent damage to the mangel crop. The carrot rust fly was also very injurious. Both these pests were largely controlled by preventative measures. The poisoned bran used destroyed great numbers of the cut-worms and by spraying the young carrot plants and the ground about them with strong tobacco water the carrot rust fly was prevented from laying eggs near the plants. As the losses incurred among all the varieties were in about equal proportions the loss is not considered in the following records.

TURNIPS.

Fifteen varieties of turnips were sown on June 8 on one-hundredth acre plots. Manure at the rate of twenty tons per acre was disced into the sandy loam soil. The seed was sown in drills thirty inches apart. The young plants were thinned to fourteen inches apart in the drills and hand hoed twice. The varieties were pulled on October 29th.

Turnips—Test of Varieties.

No.	Name of Variety.	Description of Variety.	Yield 1	per Acre	Yield pe	r Acre
2 3 4 5 6 7 8 9 10 11 12 13	Magnum Bonum Halewood's Bronze Top. Hall's Westbury : Bangholm New Century. Hazard's Improved Harlley's Br nze Top. Canadian Gem. Lapland. Jumbo Hazard's Improved.	" round Bronze " Purple " oblong " Purple " oblong " Purple round " oblong " round Bronze oblong " Purple round " Bronze oblong " Purple round " Bronze " " " Purple round " " " " " " " " " " " " " " " " " " "	Ton. 30 29 28 28 28 27 26 26 25 24 23 23 22 18	Lb. 1,000 750 700 1,800 350 1,700 1,450 300 550 550 500 1,000 1,950 800 100 200	Bush. 1, 016 979 978 963 939 928 890 871 842 842 846 749 780 735 603	Lb. 40 10 20 20 16 20 50 40 30 40 10 50 00 20

Four of the above mentioned varieties of turnips were sown on Rotation 4, section A and yielded as follows:—

No.	Variety.		Yield p	er Acre.	1
9	Good Luck Magnum Bonum Hazard's Improved Perfection	Ton. 29 29 28 27	Lb. 500 500 1,000 1,000	Bush. 975 975 950 916	00 00 00 00 40
	Average	28	1,250	954	10

The average of the same varieties grown on Rotation E, section C, was 28 tons 663 pounds or 944 bushels 23 pounds.

CHARLOTTETOWN.

MANGELS.

Fourteen varieties of mangels were sown on May 21 under similar conditions to those mentioned for turnips. They were thinned to about 12 inches apart in the row. The mangels were pulled on October 17.

Mangels.—Test of Varieties.

No.	Name of Variety.	Description of Variety.		Yield p	er Acre.	
			Fon.	Lb.	Bush.	Lb.
1	Giant Yellow Globe	Globe	26	50	867	30
2	Danish Sludstrup	Yellow Intermediate	26	00	366	40
3	Weibull's Danish Yellow		24	1,800	830	00
4	Danish Yellow Tankard		24	1,230	820	30
5	Yellow Leviathan	11 11	24	500	808	20
6	Prize Mammoth Long Red	Long Red	24	00	800	00
	Giant Yellow Intermediate		23 22	1,000	783 736	20 40
	Weibull's Mammoth Long Red		21	200 1,350	722	30
	Selected Yellow Globe	Globe	21	1,000	716	40
10 11	Perfection Mammoth Long Red	liong Red	20	1,000	683	20
12	Gate Post	Red Intermediate		200	636	40
13	Mammoth Long Red		18	500	608	20
14	Giant Half Sugar White	White Intermediate	17	1,500	591	40
	Comment and Comment of the Comment o					
	Average		28	881	748	· 1

Ten of the above varieties were sown May 22 on Rotation Λ 4, and yielded as follows:—

No.	Variety.	Yield per Acre.						
		Ton.	Lb.	Bush.	Lb.			
1	Giant Yellow Globe	28	1,500	958	20			
	Mammoth Long Red	28	1,000	950	00			
3	Danish Sludstrup	27	00	900	00			
4	Prize Mammoth Long Red	27	00	900	00			
5	Perfection Mammoth Long Red	26	1,500	891	40			
6	Giant Yellow Intermediate	26	100	868	20			
7	Yellow Leviathan	26	00	866	40			
8	Selected Yellow Globe.	26	00	866	40			
	Gate Post	25	00	833	20			
	Giant Half Sugar White	17	100	568	20			
	Average	25	1.620	860	20			

The average of the same varieties grown on Rotation F, section C, was 22 tons 690 pounds or 744 bushels 50 pounds.

CARROTS.

Five varieties of carrots were sown on May 22, and pulled October 30. They were sown in rows fifteen inches apart and the young plants were thinned to about three inches apart in the row.

CARROTS.—Test of Varieties.

No.	. Name of Variety.		Yield	per Acre.	
4	Improved Short White. White Belgian Mammoth White Intermediate Giant White Vosges. Ontario Champion	Ton. 17 15 15 14 12	Lb. 200 1,800 00 1,800 1,800 1,800 320	Bush. 570 530 500 496 430 505	Lb. 00 00 00 40 00

SUGAR BEETS.

Four plots of sugar beets were sown May 22 and harvested November 7, 1914. They were sown in rows 30 inches apart and thinned to about 8 inches apart in the rows. The soil, a sandy loam, received a light dressing of manure and was therefore in good condition.

SUGAR BEETS.—Test of Varieties.

No.	Name of Variety.	Tame of Variety.					
4	Vilmorin's Improved A Klein Wanzleben	Ton.	Lb. 1,000 1,500	Bush. 516 491	Lb.		
4	French Very Rich Vilmorin's Improved B Average	13 12 14	1,500 1,500 375	458 425 472	20 00 55		

CLOVER, ALFALFA AND GRASSES.

The cool backward spring retarded the growth of the clovers and grasses. In many meadows, however, the grasses won out under the handicap and good crops of mixed hay were saved from all of the fields on the farm. The following records are taken from the farm rotations.

FIELD CROPS OF HAY.

Class of Hay.	Field.	Preceding Crop.	_Acreage.	Yield per Acre		
Clover	C.1	Oats	0.57	Ton.	Lb.	
Mixed Hay	G. 4	Hay	0:4 0:4 0:4 1:0	2 2 2 2	1,862 1,362 1,300 1,260	
Mixed Hay	A.2 D.1 C.2	Wheat	0.4 1.0 1.0 0.57	2 2 2 1	1,237 410 300 1,588	
Mixed Daisy Hay	F.1 B.3	H Comment	1·0 0·86 1·0	1 0 2	1,600 546 1,950 447	

VARIETY TEST OF GRASSES AND CLOVERS.

A number of grasses and clovers were sown in duplicate and triplicate.

Name of Variety.	Number of Piot.	Character of Hay.	Yield per Acre. Seed sown 1913.		per Acre.
Swedish Red Clover (early). Swedish Red Clover (late) Swedish Alsike. Early Red Clover Mammoth Red Clover Malsike Clover White Dutch Clover Turkestan Alialfa. Alfalfa C.C. Seed Timothy Orchard Grass Kentucky Blue Grass Red Top English Rye Grimm Alfalfa (1912) Grimm Alfalfa (1911) Grimm Alfalfa	2 3 4 5 6 7 8 9 10 11 12 13 14	Clover	2 1,193 2 140 2 1,760 1 1,860	1 1 1 1 1 1 1 1 1 1	Lb. 1680 730 40 26 460 440 250 1,480 700 60 1,380 65 1,750 1,140

The averages given above are mostly from triplicate plots. In the case of the clovers and alfalfas the natural grasses very nearly took possession during the early part of the spring when the weather was cold.

Several strains of Grimm alfalfa and common alfalfa were sown in rows in 1912 for seed purposes. They did not produce any seed in 1913. They grew strong and bloomed freely but the seed failed to set.

EXPERIMENTAL STATION, NAPPAN, N. S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

SEASONAL NOTES.

The growing season of 1914 was an unfavourable one owing to the cool weather during the spring, the very dry period in midsummer, and the cold weather and heavy rains in the fall which caused premature cessation of growth.

The snow which covered the ground very satisfactorily during the whole winter disappeared during the latter part of March. During April, the weather was very unsettled. May gave promise of much finer weather, but a change occurred during the latter part of the month and June was ushered in with flurries of snow and very low temperatures. On the night of the third the temperature dropped to 26°. Cool days with very frequent rains characterized this month. Unsettled weather began during the second week in September and continued to the end of the growing season. Dull, cold and damp weather prevailed with only occasional fine days. As a result of this the land became very wet, making the harvesting most disagreeable. Notwithstanding these unfavourable conditions, the roots were stored in perhaps even better condition than last year. Up to the 16th of October weather conditions were most favourable for harvesting, but a cold wet spell was experienced after that date and caused some delay. Quite heavy frosts were recorded during the early part of the month. Only fair progress could be made in fall ploughing as much of the land was too wet. The total precipitation was 2.46 inches. Cold wet weather prevailed throughout the first three weeks of November. The remaining part of the month was very fine and mild allowing the harvesting of the roots to be completed in fair condition. The total precipitation was 2.97 inches.

Weather Observations taken at Nappan Experimental Farm, 1914.

Month.	Т	EMPERATURE	F.		Total		
ATOMON,	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	Sunshine.
1914.	•		0	Inches.	Inches.	Inches.	Hours.
January February March March April May June July August September October November December	46 42 46 61 79 77 84 84 84 69 60 51	-19 -27 8 8 24 26 35 40 33 20 7 -17	13·5 7·5 30·17 33·94 49·03 54·19 61·54 62·84 56·25 47·02 33·59 20·22	1:30 0:30 1:73 1:89 0:75 4:23 3:61 2:95 3:05 2:46 2:97 1:46	17:00 23:00 4:00 18:00	3·00 2·60 2·13 3·69 0·75 4·23 3·61 2·95 3·05 2·46 2·97 1·46	92:40 138:50 107:85 172:05 147:10 248:50 255:00 210:80 161:75 139:185 85:75 110:15
Total for yea Average for s Total for six Average of fi to Septemb	growing mo	oths, April to	September.	26.70 30.83 16.48 17.56	62·00 56·74 18·00 6·3	32·90 36·71 18·28 18·19	1844 20 2003 04 1190 20 1298:65

INDIAN CORN FOR ENSILAGE.

Nine varieties of Indian corn were tested in duplicate test plots of 1400 of an acre in size. The soil, a heavy clay, was treated somewhat differently from last year with apparently better results.

The field was pastured during the summer of 1913 and manure spread early in the fall at the rate of twenty tons per acre. This was ploughed under very shallowly as soon as the ground could be worked in the spring, cutaway harrowed twice and smoothing harrowed once before and twice after planting. No fertilizer was used.

The seed was sown on May 30 at the rate of twenty-five pounds to the acre. Couch grass proved to be very troublesome in the field and three hoeings and five cultivations were necessary to keep it under control. Germination took place much more quickly than last year but, later, growth was very slow owing to the unfavourable weather conditions.

The following are the results obtained:-

Indian Corn.—Test of Varieties.

		Date of	Date of	Average	YIELD PER ACRE.							
No.	Variety.	Sowing.	Cutting.	Height.	1st	Plot.	2nd	Plot.	Av	erage.		
				Inches.	Ton.	Lb.	Ton.	Lb.	Ton.	Lb.		
1 2 3 4 5 6 7 8 9	Wisconsin No. 7	11 30 11 30 11 30 11 30 11 30	11 10 11 10 11 10 11 10 11 10		18 17 16 16 14 15 13 13	500 00 1,000 00 1,000 500 300 300 1,500	14 16 10 12 12 7	1,700 1,500 1,000 1,500 00 1,500 1,000 1,000 500	18 16 16 15 15 13 12 12 7	100 750 00 750 500 00 1,650 1,650 1,000		
	Average	. :			14	1,233	13	1,300	14	267		

FIELD ROOTS.

TURNIPS.

Thirteen varieties of turnips were tested in duplicate test plots of one one-hundredth of an acre in size. The soil was clay loam, ploughed the previous season immediately after the clover hay had been harvested and manured with green manure. In the spring it was cross-ploughed, cutaway harrowed twice and smoothing harrowed twice.

Seed at the rate of three pounds per acre was sown on the second of June with a Planet jr. hand drill. Two hoeings and five cultivations were given during the season, particular attention being paid to the plots immediately after heavy rains.

The roots were pulled on November 2 with the following results:-

TURNIPS-Test of Varieties.

No.	Name of Variety.		Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.				Average.			
		Ton	. Lb.	Bush.	Lb.	Ton	. Lb.	Bush.	Lb.	Ton.	Lb.	Bush.	Lb	
1	Good Luck	29	500	975	00	26	. 00	866	40	27	1,250	920	50	
2 3	Halewood's Bronze Top Hartley's Bronze Top	27 26	1,200 1,000	920 883	00 20	26 27	500	875 900	00	26 26	1,850 1,500	897	30 40	
4	Magnum Bonum	29	500	975	00	24	500	808	20	26	1,500	891	40	
5	Canadian Gem	29	1,500	991	40	23	1,000	782	20	26	1,250	887	30	
6	Perfection	26	500	875	00	26	1,000	883	20	26	750	879	10	
7	Hall's Westbury	26	00	866	40	23	1,500	791	40	24	1,750	829	10	
8	Corning's Lapland	27	-800	913	20	22	500	741	40	24	1,650	827	30	
9	New Century	27	1,500	925	00	21	1,000	716	40	24	1,250	820	50	
10	Mammoth Clyde	28	500	941	40	20	1,500	691	40	24	1,000	816	40	
11	Hazard's Improved	27	1,000	916	40	20	1,000	683	20	24 23	1 000	800	00	
12 13	Jumbo	26 24	1,000	866 816	40 40	21	00 500	700	20	22	1,000 1,750	783 762	20 30	
1.0	Bangholm	41	1,000	010		21		1170		22	1,100	102	. —	
		27	769	912	49	23	846	780	46	25	808	846	48	

MANGELS.

Eleven varieties of mangels were tested in duplicate test plots of one one-hundredth acre each. The soil was a clay loam and was prepared in the same way as that for turnips. It also received the same cultivation.

Seed was sown on June 2 at the rate of six pounds per acre and the roots were pulled on October 23. The plants were thinned to twelve inches apart in the rows which were twenty-eight inches apart.

The following results were obtained.

Mangels-Test of Varieties.

No.	Name of Variety.		ield Acre. Plot.	Yie per A 1st P.	cre.	per	Tield Acre. Plot.	Yie per A 2nd F	cre.		Ave	erage.	
		Ton.	Lb.	Bush.	Lb	Ton.	Lb.	Bush.	Lb.	Ton.	Lb.	Bush.	Lb.
1 2 3	Selected Yellow Globe Yellow Leviathan Giant Yellow Interme-	15 14	1,700 500	528 475	20 00	20 18	1,800 1,400	696 623	40 20	18 16	750 950	612 549	30 10
4	diate	13 15	1,600 1,200	460 520	00	18 16	1,100 1,000	618 550	20	16 16	350	539	10
5	Giant Yellow Globe	11	1,700	395	00	20	300	671	00 40	16	100	535 533	00 20
6	Prize Mammoth Long Red	11	300	371	40	19	00	633	20	15	150	502	30
7 8	Gate Post	11	400	373	20	18	00	` 600	00	14	1,200	486	40
	Long Red	12	200	403	20	16	500	541	40	14	350	472	30
9	Giant Half Sugar White	13	1,400	456	40	14	1,000	483	20	14	200	470	00
10 11	Danish Sludstrup Golden Tankard	9	30 0	306 305	40 00	17 16	400 500	573 541	20 40	13 12	400 1,400	440 423	00
		12	1,064	417	44	17	1,636	593	56	15	350	505	50

Field crop of mangels.—Three one-acre field lots of mangels were sown on June 4. The varieties used were Long Red, Yellow Intermediate and Yellow Globe. The soil was a clay loam and received the same cultivation, preparation and treatment as that alloted to variety tests with mangels and turnips, with the exception that the manuring was done in the spring.

The season proved to be an unfavourable one for this crop. The seed germinated very slowly and very poorly. In the case of the Yellow Globe the seed germinated so poorly that the acre had to be ploughed up and resown to turnips. The acre of Yellow Intermediate was very little better and gave very unsatisfactory returns. The Long Red field, although better than the others, also gave a light crop. This failure can be accounted for as being due to poor seed and unfavourable weather, since the soil was in as high a state of cultivation as it could be made.

The two acres of Long Red and Yellow Intermediate were harvested on October 29, and yielded as follows:—

Size of plot.	Variety.	Yield 1	per acre.	
1 acre	Long Red Yellow Intermediate	Lb. 1065 1950	Bush. 384 199	Lb. 25 10

CARROTS.

Six varieties of carrots were tested in duplicate test plots one one-hundredth of an acre in size. This soil was also a clay loam receiving the same treatment as that of the other variety tests.

Seed was sown on the 2nd of June with a Planet jr. hand drill and the roots were pulled on November 2. The plants were thinned twice, the last thinning leaving them four or five inches apart in the rows which were twenty-eight inches apart. The plots received the same cultivation and care as those of turnips and mangels. Only a fair crop was realized, due to the unfavourable weather conditions.

The following were the results obtained:-

CARROTS—Test of Varieties.

No.	Name of Variety.	Yield per acre. 1st Plot.		cre.	Yield per acre. 2nd Plot.				Average.					
2 3 4 5.	Giant White Vosges Mammoth White Intermediate White Belgian Improved Short White Ontario Champion Half Long Chantenay Average		583 553 508 533	Lb. 20 20 20 20 20 37	17 17 17 16	700 500 1500	Bush. 578 575 591 550 511 443 541	Lb20 00 40 00 40 20 -40	17 16 16 16 15 13	850 1850 1000 500 350 300	Bush. 580 564 550 541 505 438 530	50 10 00 40 50 20		

SUGAR BEETS.

Four varieties of sugar beets were tested in duplicate test plots of ½00 of an acre in size. The plots received the same preparation, treatment and cultivation as those of other roots. The rows were twenty-eight inches apart and the plants thinned to twelve inches in the rows.

The results were as follows:-

SUGAR BEETS .- Test of Varieties.

No.	Name of Variety.		Yield Per acre. 1st Plot. Yield Plot.		acre.	Yield per acre. 2nd Plot.		Yield per acre. 2nd Plot.		Average.			
2 3	French Very Rich Vilmorin Improved B Vilmorin Improved A Klein Wanzleben.		Lb 1,500 300 200 100	291 238 236	. Lb.	Ton. 9 9 9 8	I.b. 600 300 200 1200	Bush. 310 305 303 286	Lb. 00 00 20 40	Ton. 9 8 8 7	Lb. 50 300 200 1650	Bush. 300 271 270 260	Lb. 50 40 00 50
	Average	7	1,025	250	25	9	75	301	15	8	550	275	50

ALFALFA, CLOVER AND GRASSES.

Alfalfa.—Up to the present time alfalfa has not been grown successfully at this station. It generally winter-kills during the first and second winters.

The plot seeded this year was half an acre in size; the soil a clay loam in a fair state of cultivation. The previous year half this area had grown a grain crop and the other half alfalfa. It was ploughed immediately after the crops had been harvested and half of the field subsoiled. Inoculated soil was taken from that half on which alfalfa had been grown and spread on the other half at the rate of two hundred pounds per acre. The field was then divided lengthwise and the whole seeded, one half with a nurse crop of barley and the other without. By this experiment the testing of the effect of subsoiling and of seeding with and without a nurse crop in the same experiment, was made possible.

The seeding was done during the last week of June at the rate of twenty-five pounds per acre. An excellent stand was obtained with the exception of one strip, the soil of which seemed to be too acid. The plot sown without a nurse crop made a stronger and more vigorous growth than the other. It consequently went into the winter in a much better condition. No difference could be noted between the field which had been subsoiled and that which had not been so handled.

Clovers—During the summer of 1913 five pounds of Red Clover were sown in uniform test plots ½5 of an acre each. The soil, which was a clay loam, had grown a previous crop of grain. It was ploughed during the spring, well cultivated and a light dressing of commercial fertilizer (200 pounds per acre) harrowed in with a smoothing harrow. Seed was sown on the 10th of June.

Unfortunately all the plants were killed during the winter of 1913-14. This was, no doubt, caused by the alternate freezing and thawing which occurred during March, after the snow had disappeared.

The object of this experiment with clover is to endeavour to procure, by natural selection, varieties that will withstand the severe climate. To accomplish this, the plots were again seeded to clover.

Grasses.—Five plots of timothy were sown in duplicate sets of 1/85 of an acre each. The soil was a clay loam, receiving the same treatment as that for clover. One set of plots was set aside for hay production and another for seed production.

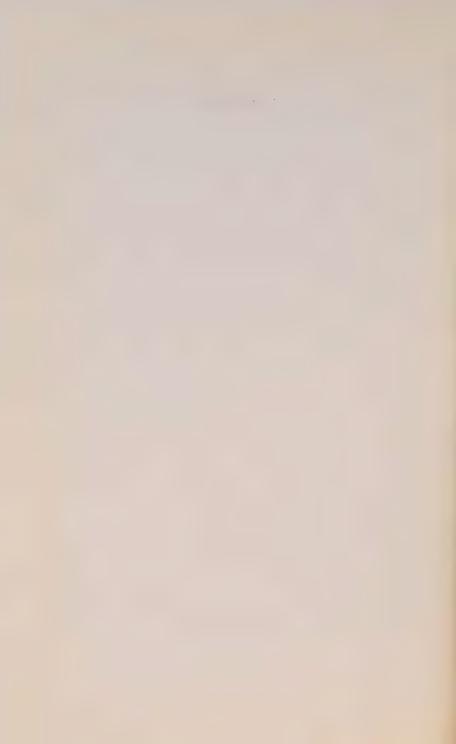
The following are the results obtained this season:-

Plot.	<u></u>	acre	d per, hay action.	Yield per acre seed production.
	, ,	Ton.	Lb.	Lb.
1	Timothy.	2	675	250
2 2	Timothy. Timothy.	2	1,695	325
3	Timothy	2	1.950	
4	Timothy.	3	545	500
5	Timothy. Timothy.	3	375	450
5	Timothy			400

By selecting seed, year after year, from plants which prove to be hardy it is hoped ultimately to obtain strains of clover and grasses characterized not only by increased hardiness, but likewise by increased productive power.



Timothy breeding.—Selection and isolation of superior types.





Lacombe, Alta, -A catch of clover can be had with barley as a noise crop. (See clover in butt of sheaf)



Red clover plots showing difference in hardiness. Plot to the right from seed grown in the Ottawa district, plot to the left from commercial seed.







EXPERIMENTAL STATION, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. S. BLAIR.

The season of 1914, except during July, was favourable for the root crops. The rainfall during July was only 1.45 inches, with the result that the crops suffered a check during the month. The season was, however, relatively cool, and thus materially favoured the turnip crop. Corn did not make vigorous growth until after the middle of August, when the temperature was much more favourable. The first fall freet was on the 1st of October.

INDIAN CORN.

Eleven varieties of Indian corn were planted on June 6. The soil was a sandy learn of low fertility. The previous crop was potatoes, and the ground was ploughed after harvest in the fall. The land was manured in the spring with stable manure at the rate of 15 tons per acre. This was ploughed under, and after this the ground was levelled and commercial fertilizer made up of nitrate of soda, acid phosphate and muriate of potash containing 4 per cent nitrogen, 8 per cent phosphoric acid and 5 per cent potash, was sown broadcast, at the rate of 400 pounds per acre, and harrowed, in. The seed was planted in rows 3½ feet apart at the rate of 30 pounds per acre. The yield per acre is calculated from plots of one-eightieth acre each. The crop was harvested October 2. The yields obtained were as follows:—

Indian Corn.—Test of Varieties.

No.	Name of Variety.	Height.	Condition when cut.		ield acre.
2 3 4 5 6 7 8 9	Wisconsin No. 7 Golden Glow Compton's Early White Cap Yellow Dent King Philip Longfellow Early Longfellow Barly Longfellow North Dakota. Canada Yellow Free Press	97 96 96 90	Silk. " Early milk. Late milk Silk Early milk Glazed. Hard glazed.	Ton. 18 17 17 15 14 14 14 13 12 10 7	400 1,600 600 400 1,200 800 00 1,200 800 1,600 400
	A serage			14	273

FIELD ROOTS.

The ground on which the roots were grown was of a sandy loam texture of fair fertility. It was manured with stable manure at the rate of 20 tons to the acre the previous fall and ploughed. After having been ploughed this spring it was fertilized at the rate of 500 pounds per acre of complete fertilizer composed of nitrate of soda, acid phosphate, and muriate of potash, containing 4 per cent nitrogen, 8 per cent phosphorus, and 5 per cent potash, scattered broadcast and harrowed in after the ground was well worked up. The seed was sown on the level with the hand seed drill in rows 30 inches apart.

TURNIPS.

Fifteen varieties of turnips were sown on May 16. They were thinned to 1 foot apart. The crop was harvested October 23. The yield per acre is calculated from duplicate plots ½32 of an acre each. The yields obtained were as follows:—

TURNIPS.—Test of Varieties.

Name of Variety.	Yield per Acre.		er Acre.		
	Ton.	Lb.	Bush.	Lh	
Jumbo	33	1320	1122	00	
New Century		1560	1092	40	
3 Corning's Lapland.,		240	1070	40	
5 Hazard's Improved	29	1400	990	00	
5 Mammoth Clyde		1680	894	40	
6 Canadian Gem		1680	894	40	
7 Halewood's Bronze Top		1240	887	20	
8 Purple Top Swede	1	600	843	20	
9 Perfection Swede	24	1900	831	40	
0 Bangholm Swede	1 2 2	1960	799	20	
1 Durham Bronze Top		200	770	50	
2 Hall's Westbury		1560	726	00	
4 Kangaroo		1560	726	00	
4 Magnum Bonum	21	680	711	20	

MANGELS.

Eleven varieties of mangels were sown May 15. They were thinned to 1 foot apart. The yield is calculated from the quantity obtained from duplicate plots 1/132 of an acre each. The yields were as follows:—

Mangels—Test of Varieties.

No.	Name of Variety.		Yield per acre.			
4 5 6 7 8 9	Giant Half Sugar White	Ton. 24 24 23 23 22 22 22 21 21 21 21	Lb. 660 140 1080 820 1480 790 620 940 770 680 330	Bush. 811 802 784 780 758 746 743 715 712 711 705	Lb. 00 20 40 20 00 30 40 40 50 20 30 ~	
	Average	22	1119	751	59	

CARROTS.

Five varieties of White field carrots were sown May 15. They were thinned to 4 inches apart. The yield is calculated from duplicate plots of one one-hundred and thirty-second of an acre each. The crop was harvested on October 22.

CARROTS-Test of Varieties.

0.	Name of Variety.			· Yield per acre.				
				Ton.	Lb.	Bush.	Lb.	
1 Mammot	h White Intermediate			17	1640	594	00	
2 Giant W	hite Vosges I Short White			17	320	572	00	
3 Improved	Short White			14	1920	498	40	
4 Ontario (Champion			14	600	476	40-	
5 White B	elgian			14	160	409	20	
				15	1328	522		

SUGAR BEETS.

Four varieties of sugar beets were sown May 15. The plants were thinned to 8 inches apart. The yield was calculated from duplicate plots each one one-hundred and thirty-second of an acre. The crop was harvested on October 22. The yields obtained were as follows:—

Sugar Beets.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Ton.	Ĺb.	Bush.	Lb.
2 3	French Very Rich	16 16 15 14	1,700 740 1,900 250	561 545 531 470	40 40 40 50
	Average	15	1,648	527	28

ALFALFA.

A piece of ground which had been newly broken up was seeded to alfalfa June 18. The soil was a sandy loam, very uneven and in a poor state of fertility. Part of it was seeded without fertilizer and part fertilized. Part of the seed was inoculated by treating with "Farmogerm" and part not so treated. A section of the soil was also limed with ground limestone and a part left without lime. The growth this season was only fair and very uneven. There was little difference in the growth on the various plots.

EXPERIMENTAL STATION, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

· · CHARACTER OF SEASON.

A good blanket of snow covering the ground from December 24, 1913 to April 10, 1914, protected grass and clover fairly well and prevented the frost from penetrating very deeply. April was a cold, backward month with a precipitation of 4.54 inches, which is nearly twice as much as the average for the month. In May, on the other hand, the precipitation was only one-third of the average. The whole month was cold and windy with frequent night frosts. Only a few hot days were registered. On the whole, the conditions were very favourable for soil cultivation but very unfavourable for growth. Cold weather continued throughout June and the first two weeks of July. On account of this, all forage crops made a very slow growth, with the exception of grass which came along fairly well. August and September brought splendid weather and, as a result, a fair average crop was generally obtained, especially of roots which, as is well known, make their growth mainly in the latter part of the growing season. The poorest crop was secured from Indian corn which on account of the cold weather in the earlier part of the season had made a very slow start. All crops were harvested under best possible weather conditions.

INDIAN CORN.

Field Crops.—Fourteen acres of corn were grown under ordinary field conditions. The land was sandy loam, naturally well drained. Ten of the 14 acres were in potatoes and turnips last season, three were from fall ploughed sod and one acre was in corn last year. The land was given a dressing of sixteen 35 bushel loads of horse stable manure per acre and also received 250 pounds per acre of fertilizer made up of nitrate of soda 31.25 pounds, sulphate of ammonia 31.25 pounds, acid phosphate 156.25 pounds, muriate of potash 31.25 pounds, containing 4.37 per cent nitrogen, 9.37 per cent phosphoric acid and 6.25 per cent potash.

The fourteen acres were planted with Pearce's Prolific, Wisconsin No. 7, White

Cap Yellow Dent and Longfellow.

On account of the cold weather in May which prevented the ground from warming up sufficiently for the quick germination of corn, planting was not started until June 3. It was finished by June 13. Planting was performed with a two row planter which applied the fertilizer in the row. The rows were $3\frac{1}{2}$ feet apart and the seed evenly distributed at the rate of half a bushel per acre.

The corn began to appear above the ground on the 18th of June and, unfortunately, attracted large flocks of crows. Corn poisoned with Rough-on-Rats was spread about plentifully and although it was all taken there did not seem to be any diminution of the numbers of crows. Strychnine, mixed in slaughter house offal, was also used and no doubt, poisoned many crows, but, in spite of all, the flocks continued to hover about. A man was therefore put on to patrol the field from dawn to dark. Before this was done, however, the crows had, in two mornings, thoroughly gone over about three acres and removed fully 75 per cent of the seed planted. The ground thus devastated by the crows was replanted, on June 22, with Compton's Early. Before being planted the seed was soaked in warm water for twelve hours.

On account of the partial removal of the seed and replanting with a different variety no record could be kept of the yields of the different varieties. The yield for the 14 acres was at the average rate of 9 tons per acre. The stalks when cut on the 1st of October were fairly well cared and their height approximately the same as that in the variety tests recorded below. The kernels had reached the early milk stage.

The corn was kept well cultivated and received one good hand hoeing to clean out mustard and couch grass. The part planted on sod was also hoed a second time

to keep down the couch grass.

The total cost of labour for raising and harvesting the corn crop, cutting it, and putting it in the silo was \$370.88, i.e., \$26.49 per acre or \$2.91 per ton.

As stated above, the land was manured at a rate of sixteen 35 bushel loads of manure per acre. In addition, it received 250 pounds of fertilizer to the acre. The

value of the additional fertilizer was tested in the following way.

One plot of one-fifth of an acre was given both manure and fertilizer, at the rates mentioned above. Another, of the same size, was manured only. Both plots were planted with Early Longfellow. The plot on which fertilizer was used in addition to manure yielded at a rate of 7 tons 1,764 pounds to the acre. The plot, which had received manure only yielded at the rate of 7 tons 1,090 pounds to the acre. The difference in yield between the two plots was consequently 674 pounds.

The cost of the 250 pounds fertilizer was \$3.61 and the value of the increased yield of corn estimated at \$3 per ton was \$1.01. The fertilizer had quite a marked effect at first, and at the beginning of August the relative appearance of the two areas would have led the observer to suppose that the fertilized area would give nearly twice as much as the unfertilized one. Afterwards the growth evened up so that no difference was apparent, either in height of stalk or number and maturity of ears.

Variety Tests.—Eight varieties of corn planted separately on the 12th of June and harvested on the 5th of October yielded as per the following table:—

Indian Corn—Test of Varieties.

No	Variety.	Yield p	er Acre.	_
3 4 5 6 7	King Philip. Golden Glow Bailey Wisconsin No. 7 Compton's Early White Cap Yellow Dent Early Longfellow	Ton. 16 16 15 14 11 10	Lb. 1,638 1,142 673 1,040 314 578 1,780	
8	Canada Yellow	13	938	

FIELD ROOTS.

TURNIPS.

Turnips were sown on eight acres of land which had been in corn in 1913.

In 1913, the land was manured at the rate of eighteen 35-bushel loads of horse stable manure per acre. It also received an application of 468 pounds of fertilizer to the acre, containing 3.6 per cent nitrogen, 10 per cent phosphoric acid and 5.5 per potash. After the corn had been removed, the land was ploughed.

In the spring of 1914 the land was dragged and disc harrowed at intervals. Sixteen 35-bushel loads of horse stable manure to the acre were incorporated with the

soil and, later, three hundred pounds of basic slag applied broadcast.

The land was then ridged up slightly with a potato planter, and at the same time 265 pounds of fertilizer were applied. This fertilizer was made up of 40 pounds nitrate of soda, 40 pounds sulphate of ammonia, 70 pounds bone meal, 70 pounds acid phosphate, and 45 pounds muriate of potash. This with the basic slag made 565 pounds per acre of a mixture containing approximately 3 per cent nitrogen, 10 per cent phosphoric acid and 4 per cent potash.

The ridges were then rolled and the seed sown with a hand sower at the rate of

four pounds to the acre.

As will be seen from the following tables, a number of varieties were 'sown June 11 and 12, others June 23 and 24, i.e., nearly two weeks later. The latter seeding was badly attacked by the Turnip fly, and an acre and a half was stripped so clean before it was noticed that it was harrowed up and reseeded to a purple top white turnip. The balance of the field was sprayed twice with a solution of 2 pounds arsenate of lead to 40 gallons of water, and the young turnips successfully brought past the age of destruction from the fly.

Horse cultivation began as soon as the turnips showed plainly in the rows and was given at least once each week until the tops began to cover the ground. Thinning was done when the little plants were in their fourth leaf and the plants left not closer than 12 inches apart.

Turnips.—Test of Varieties. Sown June 11 and 13.

^T 2	Variety.	Variety. Yield per Acre.		
3	Jumbo. New Century Hazard's Improved Kangaroo Canadian Gem Average	Ton. 29 24 27 27 27 26 28	Lb. 725 840 1,920 1,430 1,505	Bush, Lb. 978 45 947 20 932 00 923 50 891 45 934 44

Turnips.—Test of Varieties. Sown June 23 and 24.

· (),	Variety.		Yield per Acre.				
		Ton.	Lb.	Bush.	. Lb.		
1	Good Luck	25	460	841	00		
	Magnum Bonum	24	1,820	830	20		
8	Corning's Lapland	24	785	813	5		
4	Hall's Westbury	23	630	777	10		
5	Bangholm	22	1,530	758	50		
ŝ	Halewood's Bronze Top	22	1,260	754	. 20		
	Perfection	21	1,935	732	15		
8	Mammoth Clyde	21	1,645	727	25		
	Sutton's Champion	21	535	708	55		
	Hartley's Bronze Top	20	1,470	691	10		
	Average	22	1,807	763	27		

Ewing's Improved Purple Top White, sown on July 14, yielded at the rate of 25 tons 1,365 pounds, or 856 bushels 5 pounds, to the acre.

With a view of securing a supply of turnips for seed production in 1915, 7,295 roots of the Kangaroo variety were selected. These were carefully pulled and stored separately. Their weight, with some earth adhering, amounted to 14 tons 550 pounds.

FREDERICTON.

CARROTS.

Five varieties of carrots were grown on land which was in corn in 1913, and treated, that year, as described above for turnips. In 1914, sixteen 35-bushel loads of horse stable manure were applied and incorporated with the soil.

The carrots were thinned to four inches apart in the rows.

CARROTS .- Test of Varieties.

No.	Variety.	Yield per Acre.				
2 3 4	Giant White Vosges. Improve I Short White Mammoth White Intermediate. White Belgian Ontarjo Champion.	Ton. 18 12 11 10 10	Lb. 265 50 1,580 905 575	Bush. 604 400 333 348 348 342	Lb. 25 50 - 00 25 55	
	Average	12	1,075	417	55	

SUGAR BEETS.

Three varieties of sugar beets were grown on land treated similarly to that allotted to carrots.

The seed was sown on June 12, in rows 30 inches apart. They were cultivated frequently and thinned to eight inches apart in the rows. Harvesting took place on October 31.

SUGAR BEETS .- Test of Varieties.

No.	Variety.		Yield pe	r Acre.	
2	Vilmorin Improved B	Ton. 12 10 10 11	Lb. 200 1,545 500	Bûsh. 403 359 341 368	Lb. 20 45 40

THE HAY CROP.

As yet there has been no crop of hay from a properly prepared meadow. Forty acres of old sod ground were cut over and gave an average yield of one ton per acre. Ten acres of land seeded to clover after the grain crop of last year gave one and one-quarter tons of hay per acre. The total hay crop secured from the farm was thus fifty-two and a half tons.

Two small plots were sown early in July, with seed of Ontario Variegated Alfalfa. The seed was inoculated with bacterial culture before sowing. A fairly good growth was made and nodules were formed on most of the plants examined. A part of each plot was limed at the rate of 2,000 pounds per acre and part was left without lime. No difference in growth between the limed and unlimed parts could be noticed this season. The growth was left on the ground to assist in covering the roots for winter protection. Roughly estimated, about 75 per cent of the plants were throwing vigorous shoots in the spring of 1915.

FREDERICTON.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIÈRE, QUE.

REPORT OF THE SUPERINTENDENT, JOS. BEGIN.

As the Station has been in operation only a short time, well prepared land has not yet been available for experiments with forage plants. Brief notes relating to the growing of Indian corn and field roots under ordinary field conditions, may, however, be given. An experiment showing the value of inoculation of alfalfa seed prior to sowing may also be referred to.

INDIAN CORN.

Ten acres were sown to Longfellow corn on the 5th, 6th, 15th and 16th of June. On the 15th of July the average height of the corn was 18 inches. There was no perceptible difference in height between the corn sown the 5th and 6th of June and that sown later. The average height of the corn, at the date of cutting, was 6 feet and 6 inches. The total yield amounted to 82,000 pounds, or 4 tons 200 pounds to the acre.

At harvest time, 12 per cent of the ears had reached the milk stage and 40 per

cent the silk stage. The balance were tasselled or merely heading out.

The experience from the last three years seems to indicate that, at present at least, the profitable growing of Indian corn in the district of St. Anne is rather questionable. In ordinary seasons, even the earliest varieties seldom reach the stage of maturity desirable for ensilage. Repeated experiments may, however, reveal the existence of varieties early enough to warrant their growing in the district.

FIELD ROOTS.

One acre and a third were sown to Magnum Bonum and Mammoth Clyde mangels. The seed was sown in drills, thirty inches apart. The yield per acre was essentially the same for the two varieties. The total returns from the field amounted to 33,276 pounds, i.e., 12 tons 957 pounds per acre.

EXPERIMENTS WITH "FARMOGERM."

In order to determine the value of "farmogerm" (nitrogen collecting bacteria) and its influence on the growth of alfalfa, two plots of one-twentieth acre each were set aside and seeded to alfalfa. The seed used for one of the plots had been treated with "farmogerm," whilst the seed used on the other plot had received no such treatment.

The plot provided with inoculated seed yielded 106 per cent more hay than the

plot on which non-inoculated seed had been used.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, GUS. A. LANGELIER.

The work with forage plants includes:

- 1. Variety tests with Indian corn, carrots, mangels, sugar beets and swede turnips for stock feeding.
 - 2. Experiments with growing of seed of the above forage plants.
- 3. Selection and propagation of the best strains as regards yields, hardiness, and composition.

SEASONAL REMARKS.

The spring was about an average one for earliness. There was about half an inch of precipitation during the last week of May and this helped germination of field roots and Indian corn which were sown on May 27 and 29 respectively. Corn and swedes seemed to have enough moisture in June to grow well, but carrots, mangels and sugar beets suffered. The drought which lasted all through July until August 11 certainly cut down considerably the yield of the latter crops and also that of hay. The latter was a poor crop all through the district. Indian corn for ensilage and swedes, on the other hand, were above the average, the first one being helped by the warm weather of midsummer and the other by the cool nights of the autumn. As the acreage of corn and roots was small in the district, forage has been very scarce and hay has sold higher than for many years past.

VARIETY TESTS.

The trial plots of corn and roots are all arranged in a regular three year rotation where they are followed by grain and hay. They were this year located on a rather poor but very uniform piece of sandy loam with a shaly subsoil a foot and a half down. The land was ploughed shallow soon after the hay was away from it, in 1913, manured at the rate of twenty tons per acre, cultivated three or four times during the summer. to keep down weeds and conserve moisture, and cross-ploughed in October a couple of inches deeper than at the first operation. In the spring of 1914, it was double-disced twice, and then spike-toothed harrowed. The corn was sown in hills three feet apart in all directions, whilst for roots, the land was put up in ridges 28 inches apart. The cultivetor was kept going nearly each week, when the temperature permitted it. The corn was thinned to four plants per hill, whilst carrots were singled to six inches and mangels. sugar beets and swede turnips to eight inches apart in the rows. The singling of the roots was done when they were quite small, which experience has shown to be most advantageous. Corn was all cut at the same time, before any danger of frosts, and roots were pulled late, giving them all the advantage of the cool nights of October. Check rows were used on each side of the different kinds of forage crops so that the varieties of the end would not be benefited by any extra plant food, light or air. No variety w injured by disease, birds, insects or rodents.

All varieties of Indian corn and field roots were tested in duplicate on one-hundredth acre plots.

INDIAN CORN.

Nine varieties were tested: Bailey, Canada Yellow, Early Longfellow, Free Press, Golden Glow, King Philip, Salzer's North Dakota, White Cap Yellow Dent, and Wisconsin No. 7. The average yield for the lot was 22,555 pounds per acre. As is generally the case, the varieties which gave the highest tonnage were not far enough advanced to make good ensilage when it was time to cut the corn. In this category belong Golden Glow, White Cap Yellow Dent and Wisconsin No. 7. On the other hand, Canada Yellow, Free Press and King Philip were too ripe and gave a small crop. The varieties which were about right for silage, and at the same time yielded fairly well, were Bailey, Early Longfellow and Salzer's North Dakota. Of all these, Early Longfellow is the one which seems best adapted to this district.

The following table gives detail information regarding the varieties of Indian corn tried at this Station in 1914.

Indian Corn for ensilage.

No.	Name of Variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when Cut.	Yie	ld per
2 3 4 5 6 7 8	Wisconsin No. 7 Golden Glow White Cap Yellow Dent Bailey Salzer's North Dakota. Early Longfellow King Philip Canada Yellow. Free Press. Average	# 29 # 29 # 29 # 29 # 29 # 29 # 29	11 23 11 23 11 23 11 23 11 23	81 72 84 66 60 60 48 42	Kernels just formed "Not quite glazed. In good shape for silage. Too ripe for silage. In good shape for silage. Too ripe for silage. Absolutely ripe Absolutely ripe	13 12 11 9 9 8 6	1,250 950 350 1,550 1,000 1,250 1,200 1,350 100

FIELD ROOTS.

TURNIPS.

Thirteen varieties were tested: Baugholm Sclected, Canadian Gem, Corning's Lapland, Good Luck, Halewood's Bronze Top, Hall's Westbury, Hartley's Bronze Top, Hazard's Improved, Jumbo, Magnum Bonum, Mammoth Clyde, New Century, Perfection. The average for all of them was 55,378 pounds per acre, with Good Luck on top, giving 64,950 pounds. The average for four years also places this variety at the head with 46,234 pounds, and it is therefore recommended to farmers of this part of the province of Quebec.

The following tables give details about the varieties of swedes tried at the Station

since 1911, inclusively:-

TURNIPS.—Test of Varieties.

No.	Name of Variety.		Date of Sowing.		Date of Pulling.		Yield per Acre.		d : e.
2 3 4 5 6 7 8 5	Good Luck. Magnum Bonum Mannnoth Clyde Corning's Lapland Perfection. Canadian Gem New Century Hazard's Improved. Jumbo.	11 11 11 11 11 11 11 11 11 11 11 11 11	21-26 21-26 21-26 21-26 21-26 21-26 21-26 21-26 21-26	1) 17 00 91 10 11 12	19-24 19-24 19-24 19-24 19-24 19-24 19-24 19-24 19-24	30 29 29 28 27 26 26	Lb. 950 730 280 1,800 630 480 1,556 1,900 1,230	Bush. 1,082 1,045 1,004 996 997 941 925 898 881 853	Lb. 30 30 40 40 10 20 50 20 50
11 12	Hartley's Bronze Top Bangholm Halewood's Bronze Top Hall's Westbury Average	17 10 10	21-26 21-26 21-26	11 11	19-24 19-24 19-24	24	1,530 730 1,230 1,378	825 812 753 922	30 10 58

Turnips.—Average Yield 1911-1914.

	Name of Variety.	Yields.									Average	
No.		19	911.	19)12.	19)13.	19	914		Yield.	
		Ton.	Lb.	Ton.	Lb.	Ton.	Lb.	Ton.	Lb.	Ton.	Lb.	
2	Good Luck	26 24 23 22	1,122 1,344 105 718	11 9 14 15	1,265 1,965 875 855	21 23 21 21	1,600 400 1,400 1,700	32 31 26 25	950 725 875 1,225	23 22 21 21	234 609 814 625	
5 6 7	Hartley's Bronze Top Mammoth Clyde Perfection Hall's Westbury	22 20 19	949 1,865 1,321	11 14 14	440 1,700 1,040	20 18 23	900 1,900 500	30 29 22	275 625 1,225	21 21 20	141 23 22	
9 10	Bangholm	22	1,639 1,874			16 18 20 22	1,750 00 750 1,450	24 24 29 26	1,525 725 1,800 1,900	18 18 25 24	1,875 53 275 1,675	
	New Century					21	1,300	27	1,550	24	1,425	

MANGELS.

Eleven varieties were tested: Danish Sludstrup, Gate Post, Giant Half Sugar White, Giant Yellow Globe, Giant Yellow Intermediate, Golden Tankard, Mammoth Long Red, Perfection Mammoth Long Red, Prize Mammoth Long Red, Selected Yellow Globe, and Yellow Leviathan. The average yield for all was 17,777 pounds per acre, Yellow Intermediate being at the head with 24,550 pounds. The average, for four years also places this variety on top with 13,537 pounds. It therefore seems to be the best variety for this district.

The following tables show that mangels have always done poorly at this Station. Recent analysis of the soil by the Dominion Chemist has shown a deficiency in lime and this may have been the cause of the failure of the crop.

Mangels .- Test of Varieties.

No.	Name of Variety.	Date of Sowing. Date of Pulling. Yield					Yield p	er Acre.	
						Ton.	Lb.	Bush.	Lb.
23456789	Giant Yellow Intermediate. Yellow Leviathan. Danish Sludstrup Giant Half Sugar White Gate Post. Mammoth Long Red. Prize Manomoth Long Red. Perfection Mammoth Long Red. Selected Yellow Globe. Golden Tankard. Giant Yellow Globe.	11	23 23 23 23 23 23 23 23 23	75 72 72 82 82 17	13 13 13 13 13 13 13 13 13	12 10 10 10 9 9 8 8 7 6	550 1,500 1,250 500 350 1,900 1,900 1,550 550 1,700	409 358 354 341 305 301 298 293 259 209 128	10 20 10 40 50 40 20 20 10 10
	Average					8 .	1,777	296	17

Mangels.—Average Yield 1911-1914.

1911. Ton. Lb. 9 1,429 7 263		Lb. 1,280	2	Lb. 890	Ton.	Lb. 550	Ton.	Eb. 1,537
9 1,429	2	1,280	2	890	12	550	6	
4 1,021 3 553 4 18	1 1 0	• • • • • • • • • • • • • • • • • • • •	3 2 2 2 1 1 1	1,894 1,660 1,030 1,434 1,630	8 7 3 10 10 10 9 8	1,900 1,550 1,700 500 1,500 1,250 100 1,900	4 3 2 6 6 6 5 5	1,740 1,314 1,708 1,418 1,197 580 140 767 765 1,625
				1 1 1 1 1	2 1,894 1 1,660 1 1,030 1 1,434 1 1,630 1 700		2 1,894 10 500 1 1,660 10 1,500 1 1,030 10 1,250 1 1,434 9 100 1 1,630 8 1,900 1 700 6 550	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

CARROTS.

Five varieties were tried: Giant White Vosges, Improved Short White, Mammoth White Intermediate, Ontario Champion, White Belgian. The average yield was 10,350 pounds per acre. Mammoth White Intermediate came out No. 1, with 12,050 pounds. The average of four years places Improved Short White at the head with 13,962 pounds per acre and, up to the present, it seems to be the variety best adapted to this district.

The following tables give yields of all varieties tried at this Station since 1911:-

CARROTS.—Test of Varieties.

No.	Name of Variety.		te of wing.		ate of		eld Acre.	per A	
2	Mammoth White IntermediateGiant White Vosges	11	27 27 27	11	26-29 26-29 26-29	Ton. 6 5 5	Lb. 50 1,400 100	Bush. 200 190 168	Lb. 50 00 20
4	Ontario Champion White Belgian Average)) (1)	27 27	11	26-29 2 6-29	4 4 5	$ \begin{array}{r} 1,450 \\ \hline 750 \\ \hline 350 \end{array} $	157 .145 172	30 50 80

CARROTS.—Average Yield 1911-1914.

No.	Name of Variety.		Average			
140.	Itamo ot various.	1911.	1912.	1913.	1914.	yield.
2 3 4 5	Improved Short White		Ton. Lb. 2 1,197 1 1,547 1 1,300 1 887 1 1,052	Ton. Lb. 9 1,350 10 400 10 1,700 8 1,300 6 1,500 4 300	Ton. Lb. 5 100 6 50 4 1,450 4 750 5 1,400	Ton. Lb. 6 1,962 6 1,529 6 371 6 92 5 683 4 1,850

SUGAR BEETS.

Four varieties were tried: French Very Rich, Klein Wanzleben, Vilmorin A, Vilmorin B. The average for the lot was 9,200 pounds per acre and Vilmorin A was on top with 10,600 pounds.

A table is given showing the yields of 1914, but no table is offered showing average for four years because, for some reason or other—deficiency of lime in the soil or bad germination of the seed due to a lack of moisture—this crop has been practically a total failure in 1911-12-13:—

SUGAR BEETS—Test of Varieties.

No. Name of Variety.	Date of Sowing.	Date of Pulling.	Yield p	er Acre.
1 Vilmorin Improved A	n 23 ,	Oct. 8	5 600 5 500 5 200	Bush. Lb. 176 40 175 00 170 00 91 40 153 20

NUTRIENTS IN DIFFERENT KINDS OF FORAGE CROPS.

The live stock men will no doubt be interested to see how the digestible nutrients compare in Indian corn and roots. The following table takes in every plot used for variety tests since 1911 inclusively:—

DIGESTIBLE NUTRIENTS IN DIFFERENT FORAGE CROPS.

\.	Kind of Forage Crop.	Number of	Yield per	Dry Matter	DIGESTIBLE NUTRIENTS PER ACRE.			
. 10.	Kind of Polage Crop.	Plots.	Acre.	Acre.	Protein.	Carbo- hydrates.	Fat.	
			Lb.	Lb.	Lb.	Lb.	Lb.	
2	Swede Turnips Indian Corn Carrots Mangels	58 25 26 45	43,756 17,020 11,869 9,697	4,988 3,523 1,353 882	437 · 56 170 · 20 94 · 95 96 · 97	3,544·0 2,025·0 913·9 533·0	87.51 68.08 35.61 19.39	

SEED GROWING.

Seed of early varieties of Indian corn, Red clover and Swede turnips has already been grown at the Station. That seed of timothy, alfalfa, carrots, mangels and sugar beets can be grown in this district seems also reasonably sure. So far, however, no data bearing on the subject have been secured.

This year, nine lots of Red clover and Timothy were sown in duplicate plots, the object being to raise a strain perfectly suitable to the local conditions. The final

CAP ROUGE.

results of these experiments which involve seed growing of each lot and propagation of those plants which prove superior can not be expected until after four to six years.

The Station has, particularly during the last few years, made the observation that many of the varieties of field roots, now available commercially, are far from uniform. The correctness of the observations having been borne out by chemical analysis of the dry matter content of individual roots selected from within certain varieties, the Station is now preparing breeding work with the object of producing uniform strains having higher average dry matter content than those now available.

Representative roots of all varieties of turnips, grown at the Station, were this year sent to the Dominion Chemist for analysis. It was found that Hartley's Bronze Top and Good Luck produced the highest amount of dry matter per acre. The uniformity, as to the percentage of dry matter in individual roots of these varieties was, however, far from satisfactory. The lack of uniformity in the dry matter contest indicates that there is a possibility to produce, by proper breeding from individual roots of either variety, new varieties having a higher average dry matter content than the parental variety. A number of representative roots of either Hartley's Bronze Top or Good Luck or both will be used for breeding work next year.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

The season of 1914 was rather unfavourable for forage crops, especially for those which are harvested in the latter part of the season such as corn, roots and second crop alfalfa. The earlier part of the season was favourable and a good crop of alfalfa was cut. Other hay crops made a good start which the midsummer drought did not check very seriously. But the drought was very hard on corn and roots and on young seeding of grasses and clovers. The latter looked like a failure at harvest time but improved much under the influence of the fall showers.

INDIAN CORN.

Seventeen varieties of Indian Corn were tested this year. They were planted on May 21, and cut on September 11.

The weight as given in the following table is not a fair expression of the normal yielding capacity of the varieties, especially the early ones, because the hot dry weather brought on too rapid maturity and caused drying-out of the plants. The drying-out process furthermore was hastened by the occurrence of a frost on August 26.

INDIAN CORN.—Test of Varieties.

No.	Variety.	Condition When Cut.	Average Height.	Yield of Fodder per Acre.
23 44 5 6 7 8 9 10 11 12 13 14 15 16	Longfellow North Dakota White Golden Glow White Csp Yellow Dent Minnesota No. 13. Canada Yellow Compton's Early King Philip Northwestern Dent Early Longfellow Thayer Yellow Dent Minnesota King August 15th Gehn. Quebec No. 28 Quebec Yo. 28 Quebec Yellow Fress Press	Firm Dough Late Milk Parly Dough Late Milk Firm Dough Early Dough Firm Dough	Ft. In. 6 0 5 2 6 6 9 5 11 6 4 5 10 5 4 5 2 6 3 5 4 9	Tons. Lb. 12 1,373 12 1,332 12 692 12 692 12 28 11 1,949 11 1,908 10 1,912 10 916 10 833 9 1,181 8 1,264 8 19 6 1,736 6 657 5 1,993 5 1,080 3 1,106

The yield of Northwestern Dent, Minnesota King and August 15th was reduced somewhat on account of imperfect germination. Golden Glow, a new variety from Wisconsin, made a very good showing, being not only near the top in yield but also well advanced toward maturity. Minnesota No. 13 is another comparatively new variety that made a good showing this year. Longfellow and North Dakota White are reliable varieties and stand at the head in yield this year.

AVERAGE YIELDS.

Three of the above varieties have been grown for five years, three more have been grown for four years and the others for three. The average results for these periods are as follows:—

Variety.	Average Condition When Cut.		ge Yield Acre.
Compton's Early (average of 5 years). Longfellow (average of 5 years). Northwestern Dent (average of 5 years). North Dakota White (average of 4 years). Quebes Yellow (average of 4 years). Gehu (average of 4 years). Winnesota King (average of 3 years). White Cap Yellow Dent (average of 3 years).	Late Milk	16 16 17 14 13 12	Lb. 1,146 1,222 1,362 964 1,476 289 837 1,934

FIELD ROOTS.

TURNIPS.

Fourteen varieties of turnips were tested this year. None but Swede varieties were used as past trials have shown that the other types are distinctly inferior. They were sown on May 13th on well prepared summer fallow, and were harvested on October 19th. The yields were as follows:—

TURNIPS .- Test of Varieties.

No.	Variety.	Description of Variety.	Yield per Acre.			
6 7 8 9 10 11	Hall's Westbury Carter's Imperial Good Luck Lapland Prize Purple Top. Hazard's Improved Bronze Top. Halewood's Bronze Top. New Century Bangholm Hartley's Bronze Top. Canadian Gem	Purple " " " " " " " " " " " " " " " " " " "	22 1,360 22 510 21 1;389 20 1,860 20 1,610 20 930 20 470 20 1,060 19 1,050 19 1,050 19 280 18 290	Bush. Lb. 756 00 741 50 723 00 697 40 693 30 652 10 651 00 650 50 638 00 604 50 602 00 546 20		
	Average		19 1,911	665 11.		

Perfection Purple Top gave the largest yield this year, and did the same last year. On the whole the variation among these varieties is small and cannot be considered as at all decisive.

BRANDON.

AVERAGE YIELDS.

Seven varieties of turnips have been tested for five consecutive years and three others for three years with the following results:—

Variety.	Average.	Average Yield per Acre.		
Bangholm Perfection Purple Top. Hall's Westbury. Magnum Eonum Halewood's Bronze Top. Good Luck. Hartley's Bronze. Canadian Gem. Carter's Imperial. Hazard's Improved Bronze Top.	Years. 5 5 5 5 5 5 8 3 3	Ton. Lb. 25 1,405 23 1,238 22 1,934 22 984 21 1,916 20 1,220 20 318 24 1,750 22 1,377 20 878	Bush. Lb. 856 45 787 18 765 34 749 44 731 56 687 00 671 58 829 10 756 17 681 18	

MANGELS.

Thirteen varieties of mangels, including some cold as feeding sugar beets, were tested this year. They were sown on May 13th on well summer-fallowed land. Despite the drought they did well and produced an excellent crop. The results were as follows:—

Mangels.—Test of Varieties.

No.	Variety.	Description of Variety.		Yield per Acre.		
1	Giant Yellow Intermediate Yellow Leviathan	Half, long, yellow, large amount of tops. Long, yellow, smooth	42	Lb.	Bush.	Lb.
4	Giant Yellow Globe Selected Yellow Globe	Round, yellow Round, yellow very large and uniform	39 38 37	340 1,390 570	1,305 1,239 1,242	40 50 50
6 7	Windsor Red Globe	Long, red, smooth Round, red, small tops Round, vellow, smooth	36 36 36 35	1,410 1,150 630 810	1,223 1,219 1,210	30 10 30 10
9 10 11	Perfection Mammoth Long Red Giant Half Sugar White	Half long, yellow, largeLong, red, smoothLong, white	33 30 27	640 490 1,950	1,180 1,110 1,008 932	40 10 30
13	Gate Post	Round, yellow, smooth	27 23 	1,260 510 442	921 775 .	00 10 42

The results with mangels and, to a lesser degree, with turnips are extremely variable from year to year. Varieties which excel in one season may do very poorly in the next. It is apparent that there is a great deal of variation in the quality and vitality of the seed obtained from year to year, and that it is more important to get good vigorous seed of any standard variety than to choose among varieties. Golden Tankard, for instance, germinated very poorly and consequently gave a low yield this year. With better quality of seed, Golden Tankard has previously often been among the best yielders.

AVERAGE YIELDS.

Six varieties have been grown for five years and two others for four years with the following average results:---

Variety.	Average.	Average Yield per Acre.				
Prize Mammoth Long Red. Selected Yellow Globe. Giant Yellow Globe. Perfection Mammoth Long Red. Giant Half Sugar White	5 5 5 5	Ton. Lb. 31 1,647 30 1,231 29 984 28 1,559 27 38 26 1,705	Bush. Lb. 1,060 47 1,020 31 983 4 950 19 900 38 895 5			
Giant Yellow Intermediate	4 . 4	25 1,619 24 172	860 19 802 52			

CARROTS.

Five varieties of carrots were grown with the following results:

CARROTS.—Test of Varieties.

No.	Variety.	Description of Variety.		Yield per Acre		
3	Ontario Champion White Belgian Giant White Vosges Mammoth White Intermediate Improved Short White Average	Large, rough, rooty	Ton. 10 9 8 7 5	1.b. 1,490 1,580 240 910 1,180	Bush. 358 326 270 248 186	Lb. 10 20 40 30 20 00

SUGAR BEETS.

Four varieties of sugar beets for the production of sugar were tested this year. The results were as follows:—

SUGAR BEETS.—Test of Varieties.

No.	Variety.	Yield per Acre.				Percentage of sugar.
1 2 3 4	Vilmorin's Improved "B". Klein Wanzleben Vilmorin's Improved "A". French Very Rich Average	Tons. 22 20 19 16 19	Lb. 1,420 1,070 1,290 910 1,673	Bush. 757 684 654 548	Lb. 00 30 50 30	11·01 11·23 11·28 14·36

BRANDON.

ANNUAL HAY CROPS.

A series of plots of crops suitable for the production of hay the same season as sown were put in this year. They were sown about May 24 on corn and potato land. The results expressed in tons of dry hay per acre are as follows:—

Name of Crop.	Character of Hay.	Ready to cut.	Height.	Yield per acre. 1914.	Average Yield per acre. 2 years.
	Medium Very coarse. Rather coarse. Very coarse. Medium Good	July 18 18 18 18 19 19 19 10 10 11 11 11 12 13 13 14 15 16 17 18 18 19 10	35 32 37 28 44 36 23 34 28 28	Ton. Lb. 2 1,160 2 420 3 780 3 00 1 1,500 2 500 2 11,500 2 180 1 1,000 1 640	Ton. Lb. 4 580 3 1,610 3 390 3 100 2 1,610 2 1,350 2 1,220 2 800 2 20

In order to test the palatibility of the above fodders, the different varieties were fed to cattle. The same three animals were used for the test throughout. The Sand Vetch was relished most of all; the green oats were next best and were liked better than the peas and oats. The following list shows the order of palatability. It will be seen from the same that sweet clover was the least relished variety. As a matter of fact, all three animals refused to eat it. This might be partly explained by the fact that they were not accustomed to it. This explanation is, however, rather unsatisfactory as they all devoured the Sand Vetch with avidity though they had never seen it before.

ORDER OF PALATABILITY.

1st. Sand Vetch.

2nd. Green Oats.

3rd. Common Vetch.

4th. Peas and Oats.

5th. Hungarian Millet.

6th. Siberian Millet.

7th. Common Millet.

8th. Early Fortune Millet.

9th. Japanese Millet.

10th. German Millet.

11th. Sweet Clover.

It is apparent that these tests have not shown any results that would justify the farmer of Manitoba in giving up the present practice of using outs cut green as the principal substitute for hay. Sand Vetch, tried for the first time, shows some merit, but it is hard to cut as it lies flat on the ground in a tangled mass.

GRASSES, CLOVERS AND ALFALFA.

Fifteen plots of alfalfas, grasses and mixtures were harvested this year. They were sown in 1913, and this is consequently their first producing year. Some clover plots were sown at the same time but failed to germinate. This is quite unusual as red clover usually does well and in fact did well under field conditions the same season. The results for 1914 and the average for three years are given herewith.

Kind of Hay Crop.		per acre, utting.		per acre, cutting.	per	l Yield acre,	per	ge Yield acre, ears.
	Ton.	Lb.	Ton.	Lb.	Ton.	Lb.	Ton.	Lb.
Common alfalfa (Montana Seed) Grimm's alfalfa (Alberta Seed). Grimm's alfalfa (Minnesota Seed). Turkestan alfalfa. Timothy. Western Rye grass. Brome grass. Brome grass. Kentucky Blue grass Timothy and Red clover. Timothy and Alfalfa. Western Rye grass and Red clover. Western Rye grass and Alfalfa. Timothy, Western Rye grass and Red clover. Timothy, Western Rye grass, Red clover. Timothy, Western Rye grass, Red clover. Timothy, Western Rye grass, Red clover.	2 1 2 2 2 1 0 3 2 3 2 3	1,920 1,120 1,960 600 560 840 520 1,000 1,400 680 1,480 600 1,560	1	1,400 1,960 800 1,120 920 920	4453222103333344	1,320 80 760 1,720 560 840 520 1,600 1,400 1,400 1,500 1,500 240	5 4 4 2 3 3 1 0 3 3 3 4 3 3	867 1,597 147 120 827 1,320 1,627 100 933 947 80 733

Alfalfa excels all other hay crops in productiveness. Not much difference is apparent among the different strains of alfalfa. Alfalfa was the only fodder plant that produced any second crop in 1914.

A new set of plots of alfalfa, clovers, grasses and mixtures, was sown in 1914. These are laid out in duplicate and on a more comprehensive scale than heretofore. A good start was made in 1914, and interesting results should be available next year.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE SUPERINTENDENT, T. J. HARRISON, B.S.A.

SEASONAL CONDITIONS.

On the Indian Head Experimental Farm the weather conditions during the summer of 1914 were unfavourable for the production of good forage crops. While there was considerable moisture in the soil from the previous fall and early spring rains the absence of rain during May and June caused a very light yield of hay. This dry weather also greatly affected the root crop, causing a poor germination and a very late crop. The cut-worms also did considerable damage to the young mangels and carrots with the result that the stand was very thin. The fodder corn was the only crop which made satisfactory growth in the early part of the summer, but it was badly damaged by frost on August 9. The result was that it was put in the silo in a very immature state and that it did not make as good ensilage as the previous year.

INDIAN CORN.

The production of fodder corn is each year becoming more important. While occasionally an early frost, such as stopped the growth of the corn on August 9 this year, will cause a lighter yield and inferior quality, the farmer who is keeping any quantity of live stock cannot afford to be without it. In raising corn for fodder there are a number of points to be observed if good crops are to be obtained in all seasons. Since labour is expensive and the climate comparatively dry, it is advisable to sow the corn only on summer-fallowed land. The planting should not be done to early—sometime between the 15th of May and the 1st of June will give the best results. After the corn has appeared above the ground good cultivation is required to keep down the weeds and conserve the moisture. This can be done in the early stages of growth with the drag harrow; later a cultivator will be required.

The corn in the variety tests this season was so badly frozen on the 9th of August that a report of the yields obtained might be very misleading, the more as some of the very early maturing sorts had attained nearly their full growth, while some of the later sorts which would make the best ensilage in a normal year gave only light yields.

In the field North-Western Dent was the variety planted. The land was summerfallow the previous year, the manure was applied on the surface of the ploughed land and disced in. It yielded as follows:—

Size of Field.	Manure applied.	Stage when cut.	Yield p	er acre.
6 acres	15 tons rotted	Early milk	Ton. 8 6 6	Lb. 401 878 1.423

FIELD ROOTS.

The yield of field roots this season was not nearly so satisfactory as last year. This was due to the attack of cut-worms and to the extremely dry summer.

FALL TURNIPS.

The Fall Turnips gave decidedly higher yields than the Swedes, but were not good keepers. Most of them could, in fact, be kept in good condition only up to Christmas time. Where turnips are to be used as a soiling crop to supplement the pastures in the fall, the Fall turnip could be used to good advantage. The following are varieties that were tested at this Farm last season. They were planted on one-fiftieth acre plots on the 1st of June and pulled on the 15th of October.

FALL TURNIPS.—Test of Varieties.

No.	Name of Variety.	Description of Variety.	Yield per acre.	Yield per acre.
2 5 4 5	Man moth Greystone Vellow Aberdeen (Purple Top)	Yellow Top. Purple Top. Purple Top. Green Top. Green Top. Purple Top.	Top. Lb. 21 00 17 1,700 16 1,100 16 1,000 14 950 10 1,050	Bush. Lb. 700 00 595 00 551 40 550 0) 482 30 350 50 538 20
			16	300

Weibull's Improved Long Yellow is a peculiar type of turnip, being very similar in appearance and shape to a white or yellow half long mangel.

SWEDE TURNIPS.

Seventeen varieties of Swede Turnips were tested on one-fiftieth acre plots. They were planted on June 1 and pulled on October 1. Where turnips are to be used for winter feeding this is the only type that should be grown, as they can be kept through the winter and fed until early spring. The following table will give the yield and a short description of the different sorts:—

SWEDE TURNIPS .- Test of Varieties.

No.	Name of Variety.	Description of Variety.	Yield p	er Acre.
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	Hartley's Bronze Top. Perfection Magnum Bonum Halewood's Bronze Top. Mannoth Clyde Jumbo Bangholm Corning's Lepland Corter's Imperial Invicta Prize Purple Top. Hazard's Improved Hall's Westbury Weibull's Danish Purple Top. New Century Canadian Gem	10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10 400 9 1,500 9 750 9 500 8 1,850	Bush. Lb. 474 10 436 40 420 50 405 50 383 20 381 40 378 20 344 10 325 60 312 80 303 20 297 30 281 40 277 30 281 40 277 30 285 50
	Average	1	. 10 000	1 111 00

MANGELS.

Where roots are being grown to be fed to cattle it is advisable to have a portion of the land sown with mangels as there is no danger of these tainting the milk when fed to the dairy cows. Last season fifteen varieties were in the variety test at Indian Head. They were planted in one-fiftieth acre plots on May 20 and pulled on October 1. The following table gives the yield of the different varieties:—

Mangels.—Test of Varieties.

No.	Name of Variety,	Description of Variety.	Yield po	er Acre.
_		: 77		Bush. Lb.
1 2	Mammoth Long Red	Long, rooty and red,	15 1,200 15 950	520 00 515 50
3	Prize Mammoth Long Red	11	15 150	502 30
5	LY CHOW Leviathan	Half long, rooty and yellow	13 1,000 13 850	450 00 447 30
6	Donish Yellow Tankard	Tankard, yellow and rooty	12 1.400	423 20
7	Gate Post	Long, rooty and red.	12 600	410 00
8	Giant Half Sugar White Selected Yellow Globe	Long, rooty and white	12 600	410 00
	Giant Yellow Globe	Tankard-shaped, smooth and yellow	11 500 10 1,650	375 00 360 50
11	Red Tankard	Tankard, red and rooty	9 1,800	330 00
12	Golden Tankard	Tankard-shaped, smooth and orange	9 600	310 00
13	Manimoth Long Red	Long, rooty and red	7 800	246 40
. 14	Danish Yellow Long Ovoid Mam- moth	Half long, smooth and yellow	7 200	235 40
	· Avérage		11 1,736	395 36

CARROTS.

The yields of field carrots on the Experimental Farm at Indian Head this season were very low because the varieties were planted within seventy-five feet of a hedge of Mani oba maple, which used a large amount of the available moisture. The yields, while low, were still comparative, and will be useful when considered in this manner. The carrots were planted on May 14 and pulled on October 14.

CARROTS.—Test of Varieties.

No.	Name of Vari ty.	Description of Var.ety.	Yield per Acre.		
2	Giant White Vosges. Ontario Champion Improved Short White. Mann.oth White Intermediate	Smooth White	Ton. Lb. 5 1350 4 100 4 50 3 1450 2 750 3 1940	Bush. Lb. 189 17 135 00 134 10 124 10 79 10 132 20	

SUGAR BEETS.

More interest is being taken each season in the growth of sugar beets, not only for the production of sugar, but also for fodder. Four varieties were sown on May 30, and pulled on October 14, with the following results:—

SUGAR BEETS-Test of Varieties.

No.	Name of	Variety.	*, %.	Descrip	tion of	Variety.	· · · Y	Tield p	er Acre.	
2	Vilmorin Improved B. Klein Wanzleben French Very Rich Vilmorin Improved A .			White n	nedium	sized	Ton. 12 11 11 10	Lb. 200 700 550 250	375	Lb. 20 20 50 10
	A verage.					ابيستنين	11	450	374	10

GRASSES, ALFALFA AND CLOVERS.

In the early days in Saskatchewan little or no attention was given to the cultivation of hay and pasture crops. This was largely due to the fact that only a small amount of stock was kept on the average farm and that the native meadow supplied all the hay and pasture required. As the country became more thickly settled these meadows were broken up to be put under cultivation. It has, therefore, became necessary to secure the hay and pasture required from cultivated grasses and clovers. Another reason for the increased interest in these crops is that the pernicious result from an all-wheat-growing type of farming is becoming apparent. In the older districts it is now necessary to adopt methods of cultivation and crop rotation that will at least hold the weeds in check and return vegetable matter to the soil. The introduction of hay crops into the rotation seems to be one of the most effective methods of accomplishing this.

PERENNIAL GRASSES.

There are a great number of cultivated grasses, but there seems to be only five or six that are suited to western conditions, among which Western Rye, Brome, Timothy, Meadow Fescue, and Red Top are the most common. No one of these can be recommended for the whole district or for all purposes. Of them all Western Rye is probably better suited to a wider range of conditions and uses than any other. This season a number of the sorts advertised by the seed merchants in the West were planted in one-fortieth acre plots. The exceedingly dry weather prevented many from starting as well as they would in a normal year. The following is a list of the varieties planted:—

TERENNIAL GRASSES.-List of Varieties.

Sweet Vernal Grass.
Timothy.
Meadow Foxtail.
Red Top.
Creeping Bent Grass.
Tall Oat Grass.
Rhode Island Bent Grass.
Orchard Grass.
Crested Dog's Tail.
Canadian Blue Grass.
Kentucky Blue Grass.
Rough Stalked Meadow Grass.
Red Fescue.

Sheep's Fescue,
Fine-leaved Fescue,
Hard Fescue,
Meadow Fescue,
Tall Fescue,
Evergreen Meadow Grass,
Crested Fescue,
Brome Grass,
Perennial Rye Grass,
(Dwarf),
Italian Rye Grass,
Western Rye Grass,

LEGUMES.

The introduction of perennial grasses into the rotation will help to check the growth of weeds and to return fibre to the land, but will not help to return plant food to an exhausted soil. Legumes are the only plants known that will accomplish this. The bacteria which work on the roots of these plants have the power of changing the nitrogen in the air circulating in the soil into a form that can be used by the plants. There are many plants belonging to the family of leguminous plants which can be successfully grown in Southern Saskatchewan. The most important of the perennial and biennial kinds are alfalfa, red clover, alsike clover, white Dutch clover and sweet clover.

ALFALFA AND SAINFOIN.

Alfalfa is one of the oldest plants in the world but has only recently been introduced into the Northwest. It has been grown for some time in the Pacific States, but was not considered hardy enough to withstand the winter of the Canadian West. Hardy varieties have been discovered or originated, so that at the present time strains are available which can be grown at any place in Southern Saskatchewan. From previous experiments conducted at this Station it has been demonstrated that Grimm is one of the hardiest of the varieties available commercially. This season a number of the hardy strains were planted on one-fortieth acre plots. All germinated well and gave promise of thrifty growth last fall. The following is a list of the varieties sown:

Montana. Grimm. Province. Cherno. Turkestan.
Baltic.
Cossack.
Semi-palatinsk.

The alfalfa which was sown in the fields again demonstrated its ability to grow in dry seasons and to produce profitable crops of hay. Of the two varieties recorded below, two cuttings were secured, the total yield of which was as follows:—

Variety.	Acres in Field.	Year Sown.	Yield po	er Acre.
Turkestan	1 2 2 2	1907 1908	Ton.	Lb. 640 962

A sample of sainfoin, which plant in many respects is closely related to alfalfa and which is hardly inferior as regards feeding value, was secured and sown on onefortieth acre plots.

CLOVERS.

As alfalfa and sainfoin will not produce their maximum yields until the third or fourth year after seeding, they are not very well adapted to short rotations. In rotations where the hay crop is only to be left down one or two years, the clovers can be used to greater advantage. Of the different kinds which can be grown, the Common Red clover would seem to be best adapted for this purpose. This season the following clovers were sown on one-fortieth acre plots:—

Common Red. Mammoth Red. Alsike. White Dutch. Sweet Clover.

They all seemed to make a fair growth and give evidence of a good stand next season.

GRASS AND CLOVER MIXTURES.

To obtain larger yields per acre and better balanced fodder, it is sometimes advisable to sow the grasses and clovers in mixtures. A number of different mixtures are being tried out at this station. They were sown last year on one-fortieth acre plots and should give some valuable data next year. The list of the mixtures sown is as follows:—

Brome Grass and Alfalfa.
Brome Grass and Red Clover.
Western Rye Grass and Alfalfa.
Western Rye Grass and Red Clover.
Meadow Fescue and Alfalfa.
Meadow Fescue and Red Clover.
Timothy and Alsike Clover.
Timothy, Western Rye Grass and Red Clover.
Timothy, Meadow Fescue, Red Top and Alsike Clover.

ALFALFA AND CLOVER SEED PRODUCTION.

A small acreage of alfalfa and red clover planted in 1911 was harvested for seed in 1914. Part of the alfalfa was sown broadcast and part in drills, thirty inches apart. From observation it would seem that more seed was set in the alfalfa planted in drills. While only a small quantity of seed was produced, the quality was excellent and at the market price would make a profitable undertaking on any farm. The drawback with production of seed of these legumes in small quantities in the West is that it is somewhat difficult to thresh the seed properly. The quantity which can be grown in most cases would not be sufficient to justify the expense in the purchase of an alfalfa or clover huller, and it is very difficult to thresh the seed with the calimary grain thresher. The pods are easily broken off, but the cylinder is not so arranged that it will take the seed out of the peds.

EXPERIMENTAL STATION, ROSTHERN, SASK.

REPORT OF THE SUPERINTENDENT, WM. A. MUNRO, B.A., B.S.A.

THE SEASON.

In the following table is given the precipitation in inches for the past four growing seasons from April 1 to August 15.

Month.	1911.	1912.,	1913.	1914.	Average for four years.
April May. June July. Aug. 1–15.	Inches. 0.86 2.38 3.55 2.89 0.43	Inches. 0.67 2.15 2.81 5.25 0.23	1 nches. 0 26 1 26 1 87 3 80 2 24	Inches. 0.63 1.96 2.00 1.40 0.13	Inches. 0.61 1.94 2.56 3.33 0.76

It will be seen from the above table that the precipitation during the growing season of 1914 was considerably below the average of the last four years. The months of June and July, particularly, were characterized by light rainfall. As a consequence the yields of all forage crops were below the average of previous years.

VARIETY TESTS WITH FIELD ROOTS AND CORN.

Varieties of field roots and corn were grown in rows two and a half feet apart on land which had been summer-fallowed and manured in 1913. In most cases the tests were duplicated in order to offset conflicting conditions and the results computed from an average of the two plots.

INDIAN CORN.

Eleven varieties were sown on May 13. All the corn was badly frozen on August 9 which checked the growth and caused the yield to be less than it had been for four years previously. The quality was also injured.

INDIAN CORN.—Test of Varieties.

No.	Variety.	Height.	Yield p	er Acre.
		In.	Ton.	Lb.
3 4 5 6 7 8 9	Free Press Improved Squaw Minnesota No. 13 Golden Glow North Western Dent Thayer White Dent. King Philip Canada Yellow Early Longfellow White Cap Yellow Dent Salzer's North Dakota	26 31 30 34 26 32 82 21 24 24 22	7 7 6 6 6 6 5 4 3 2 2 2	1,640 630 970 630 400 1,620 490 370 580 470
	Average		4	1,802

6 GEORGE V, A. 1916

Two acres of Northwestern Dent corn yielded 8 tons 1,920 pounds. This was sown in rows two and a half feet apart on summer-fallow that had been manured. The yield under similar conditions in 1913 was 19 tons 1,240 pounds. The low yield in 1914 was due to the dry weather and to the frost of August 9.

FIELD ROOTS.

TURNIPS.

Twenty-one varieties were sown on May 13 in duplicate plots. They yielded as follows:—

TURNIPS .- Test of Varieties.

0.	Variety.		. Yield p	er Acre.	
		Ton.	Lb.	Bush.	Lb.
7	Carter's Imperial	22	1.250	754	10
2	Rennie's Mammoth Improved Greystone	21	1,300	721	40
3	Corning's Lapland	13.	350	605	50
	Perfection	18	320	605	20
	Invicta	17	920	582	00
	Hazard's Improved	16	1,250-	554	10 .
	Yellow Aberdeen Purple Top	16	400	540	00
	Mammoth Clyde	15	1,850	530	50
	Yellow Aberdeen Green Top	15	750	512	30
	Halewood's Bronze Top	15	750	512	30
	Hall's Westbury	14	1.900	498	20
	Cow Horn.	14	200	470	00
	Hartley's Bronze Top	13	00	433	20
	New Century	13	00	433	20
	Good Luck	12	1,600	426	40
	Magnum Bonum	12	1,120	418	40
	White Globe	· 11	1,200	386	40
	Prize Purple Top.	îî	1.190	386	30
	Canadian Gem	îî	360	372	40
	Green Top.	11	60	367	40
	Jumbo	9	1,160	319	20
	Average	14	1,806	496	46

MANGELS.

The first sowing of mangels, which took place May 15, did not give satisfactory results. Owing to poor germination of the seed the plots were re-sown on June 16 and yielded as follows:—

Mangels.—Test of Varieties.

0.	. Variety.		Yield p	er Acre.	
_		Ton.	Lb.	Bush.	Lb.
7	Manitoba Giant Yellow	18	860	614	20
	Mammoth Giant Long Red	15	1,850	530	50
	Vellow Globe	15	190	503.	10 30
	Selected Prizetaker Yellow Globe	13 12	1,930 1,700	400	20
	Eclipse	7 12 12	1,700	400	10
	Peerless	11	360	372	40
	Yellow Intermediate Selected Golden Tankard.	10 -	120	335	20
	Red Intermediate	9	990	316	30
	Average	13	446	440	46

CARROTS.

Five varieties were sown on May 13 in duplicate plots. They yielded as follows:

CARROTS.—Test of Varieties.

No.		-	Variety.			Yield p	per Acre.	
3 4	Improved Short Ontario Champi White Belgian Mammoth Whit Giant White Vo	e Intermed	liate	 	3 3	Lb. 490 1,940 1,430 1,040 780	Bush. 141 132 123 117 113	Lb. 30, 20, 50, 20, 00
	A	FLOWO GIO			. 3	1.536	125	36

Under field conditions on summer-fallow that had been manured, carrots yielded 8 tons 872 pounds per acre, turnips 13 tons 1,172 pounds per acre, and mangels 37 tons 1,440 pounds per acre.

WESTERN RYE GRASS.

The main hay crop at the Station is Western Rye Grass, which is sown with a nurse crop and left in hay for the two succeeding years. The seed is sown broadcast immediately after the grain is sown and the ground harrowed and packed. The rate of seeding is fifteen to twenty pounds per acre of good seed.

The yield of hay from six acres of first year meadow was this year 1,882 pounds per acre, and from six acres of second year meadow 1,508 pounds per acre. This is the lowest yield recorded since the Station was established.

RED CLOVER.

Plots of various strains of red clover were sown in the spring of 1913. They made good growth during the season but winter-killed during the following winter. The same experiments were repeated in 1914 with the same results.

ALFALFA.

Plots of different strains of alfalfa were sown in the spring of 1914 and came through the spring of 1915 in good condition. A plot of Grimm's alfalfa was particularly good. An acre of Grimm's alfalfa seeded in 1911 yielded 1,000 pounds in 1914 and an acre of Turkestan under the same conditions yielded 980 pounds.

EXPERIMENAL STATION, SCOTT, SASK.

REPORT OF THE ACTING SUPERINTENDENT, M. J. TINLINE, B.S.A.

WEATHER CONDITIONS.

The ceason of 1914 was decidedly unfavourable for the production of forage crops of all kinds. The germination of seed of all varieties was very uniform, but from early June to the latter part of August, the soil was seldom dampened by rain to a depth of more than one inch. The drought was accompanied by high temperatures and hot dry winds.

INDIAN CORN.

The soil on which the Indian Corn was grown is a dark chocolate loam, very uniform and free from weeds. The field had been broken from the prairie in the summer of 1913, and well cultivated. The dry summer and the early frost on August 25, which made it necessary to harvest the crop early, materially decreased the yields.

Of the several varieties under test, Salzer's North Dakota gave the heaviest yield, with Early Longfellow second, and White Cap Yellow Dent third.

FIELD ROOTS.

• The field on which the various field root crops were grown is a dark chocolate c'ay loam. It was broken 4 inches deep from the prairie in the summer of 1913, and well cultivated.

Notes taken on the appearance of the roots at harvest time indicate that, even where the subsoil is fairly open, it is necessary to plough deeply before attempting to grow crops of roots.

TURNIPS.

Twenty-three varieties of turnips were sown in uniform test rows on May 2. The rows were 22 inches apart, and the young plants thinned to 12 inches apart in the rows. The crop was harvested on October 13:—

TURNIPS.—Test of Varieties.

Vo.	Variety.		Yield p	er Acre.	
	-	Ton.	Lb.	Bush.	Lb
1	Carter's Imperial	19	1.750	662	30
2	Mammoth Greystone	18	1,500	625	00
	White Globe	16	1,750	562	30
4	Hartley's Bronze Top	16	1.250	554	10
5	Magnum Bonum.	16	1.000	550	00
6	Halewood's Bronze Top	16	1,000	550	00
7	Cow Horn	16	. 1,000	550	. 00
8	Yellow Aberdeen (Purple Top)	16	750	545	. 50
9	Mammoth Clyde	16	500	541	40
10	Hall's Westbury	15	1,000	516	40
11	New Century	15	1,000	516	40
12	Hazard's Improved	15	750	512	30
13	Perfection	15	500	508	20
4	Corning's Lapland	14	1,250	487	30
15	Good Luck	14	750	479	10
16	Invicta	14	00	466	40
17	Bangholm	13	1,000	450	00
18	Yellow Aberdeen (Green Top)	13	1,000	450	00
19	Jumbo	13	500	441	40
05	Canadian Gem	12	1,250	420	50
31	Green Top	11	1,500	391	40
22	White Swede	10	1,850	364	10
23	Prize Purple Top	10	500	341	40
	Average Yield	14	1.972	499	32

MANGELS.

Eleven varieties of mangels were sown in test rows on May 22, and harvested October 13.

Mangels.—Test of Varieties.

No.	Variety.	Yield	per Acre.	Yield per	Acre.
-		Ton.	Lb.	Bush.	Lb.
2 3 4 5 6 7 8 9	Mammoth Long Red Perfection Mammoth Long Red Perfection Mammoth Long Red Selected Yellow Globe Gate Post Yellow Leviathan Danish Sludstrup. Giant Yellow Intermediate. Giant Yellow Globe. Golden Tankard	11 10 10 10 10 9 9 9	1,250 1,250 1,250 1,250 1,250 500 500 1,000 500 500 500	387 354 354 341 341 346 308 308 308 308	30 30 10 10 40 40 40 20 20 20
	Average	10	182	336	22

The long red varieties have produced the heaviest yields. They are, however, hard to pull, and apt to be broken in handling.

SUGAR BEETS.

Four varieties of sugar beets were sown. The drought and the compact soil caused the beets to become very fibrous rooted.

SUGAR BEETS.—Test of Varieties.

No.	Variety.	Shape.	Yield	per Acre.	Yield per	Acre.
3	Vilmorin's Improved "A"	Short	8	Lb. 00 1,000 1,000 750 1,188	Bush. 300 283 283 279 286	Lb. 00 20 20 10

CARROTS.

Five varieties of carrots were sown in rows 28 inches apart, and thinned to 6 inches apart in the rows.

CARROTS.—Test of Varieties.

No.	Variety.	Shape.	Yield	per Acre.	Yield pe	or Acre.
3 4		H comme	Ton. 4 3 3 2 3	1.750 1,750 1,650 900 1,250	Bush. 141 129 127 115 87	Lb. 40 10 30 00 30

LEGUMINOUS FORAGE PLANTS AND GRASSES.

ALFALFA.

An experiment was made with the object to determine the value of inoculation. The variety used for the purpose was Grimm's alfalfa. The land allotted to the experiment had been summer-fallowed in 1912 and ploughed to a depth of ten inches with a subsoiler. Three plots were sown to alfalfa without a nurse crop as follows:—

No. 1 was inoculated with soil from an old alfalfa field.

No. 2 was not inoculated with alfalfa soil; neither was the seed sown on it treated with nitro-culture.

No. 3 was not inoculated with alfalfa soil, but the seed sown on it treated with nitro-culture.

No. of Plot.	Variety.	Yield per acre.	Method of Inoculation.
1 2 3	Grimms	1450	Soil inoculation. No inoculation. Culture applied to seed.

The results, as shown by the above table, indicate that, to ensure the best results, inoculation, either of the seed or of the soil, should not be omitted when alfalfa is being started on land which has not grown the crop before.

CLOVERS AND GRASSES.

Twenty plots were sown with ten different lots of red clover seed in 1913. This season ten of these plots were cut for hay, and yields varying from 800 to 2,640 pounds per acre, were harvested, showing that there is quite a difference in the hardiness and productivity of the various types of red clover. The other ten plots were cut for seed. Some loss was experienced from a strong wind which blew some of the ripened clover away while drying in the coils. Small quantities of seed, however, were threshed from each plot, and this will be used to seed down other plots next year.

This season, duplicate plots of Kentucky Blue Grass, Red Top, Meadow Fescue, Orchard Grass, Timothy, Western Rye Grass and Sainfoin were sown. All grew very nicely except the Sainfoin, which failed to germinate. These plots will be used to determine the relative yields of fodder, and the amount of seed that can be harvested

from the different kinds of grasses.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

On account of the very dry weather prevailing during the early part of the season of 1914, conditions were extremely unfavourable for hay crops on the dry land. On the other hand the relatively high temperatures in the early part of the season, due to the absence of rain storms, made the growth of all kinds of hay and especially of alfalfa, very rapid when irrigation water was applied. Owing to the late rains, which were comparatively abundant, the conditions were much more favourable for corn and roots than for grain. In fact, the results obtained with corn on dry land were better than usual.

The investigations with forage plants were carried on as usual both on dry land and on irrigated land. In order to avoid possibilities of seepage the experiments on the dry, or non-irrigated land, are located a good distance away from and above, the main irrigation canal. The crops experimented with on the irrigated land are irrigated

in such a manner and at such time as to get the best results possible.

To avoid any confusion the report is divided into two parts. The first deals with experiments conducted on the part of the farm on which no irrigation is applied. The second part deals with experiments carried out under irrigation.

PART I.-NON-IRRIGATED OR DRY FARM.

The results obtained each season emphasized the fact that corn deserves more attention on the farms of Southern Alberta than it is receiving. Not only is it possible and much easier to obtain a good supply of roughage for stock in dry seasons than is commonly supposed, but it is also possible to make corn play a very important part in crop rotation.

To get the most satisfactory results, the land should be in a high state of cultivation. A liberal application of well rotted stable manure is a great help. As it is essential to have it well incorporated with the soil it should, if possible, be applied

the previous season.

The farmer who is keeping milk cows will find a few acres of corn, well taken care of, a great aid in keeping up the milk supply during August and the early part of September, when the pastures are dry. By having it growing conveniently near his barn or corral, he can cut some each day to feed at night without much extra labour. He will be certain to be more than pleased by the increased flow of milk.

As has been mentioned, corn did particularly well the past season. Some varieties, such as Canada Yellow and White Cap Yellow Dent, ripened a few ears.

Seven varieties were tested. They were planted May 14th in rows 3 feet apart. Each variety was grown in a plot 0.08 of an acre. They were all cut September 16.

INDIAN CORN.

Indian Corn—Test of Varieties.

No.	Name of Variety.	Stand.	Condition when cut.	Average height.	Yield 1	er acre.
1 2 3 4 5 6 7	Salzer's North Dakota King Philip. Early Longfellow. Golden Glow. White Cap Yellow Dent. Canada Yellow. Free Press.	% 86 86 79 93 87 92 88	Newly formed ears Late milk. Newly formed ears. Small ears. Newly formed ears. Dough Late milk.	Inches. 69 % 72 69.5 76 76 76 49	Ton. 13 13 12 12 11 11 8	Lb. 1750 620 1560 750 1940 250 1810

FIELD ROOTS.

TURNIPS.

Although turnips respond to good cultivation, in that they delight in well prepared land, especially if an application of well-rotted manure has been given long enough before to allow it to be well worked into the land, still, they often do wonderfully well on freshly broken sod. This is a point that should be borne in mind by the new settler who has nothing but sod land the first year.

Fourteen varieties were tested. They were all sown on summer-fallow May 4. Unfortunately, however, they were destroyed by severe wind just as they came up and had therefore to be resown. This was done June 17. They were sown in rows 28 inches apart and thinned to about 10 or 12 inches apart in the rows. They were badly injured by aphids during the summer. They were pulled October 27.

TURNIPS-Test of Varieties.

No.	Variety.	Yield Per Acre.				
		Ton.	Lb.	Bush.	Lb.	
1	Mammoth Greystone	20	1300	688	20	
2	Hall's Westbury	20	600	676	40	
3	Perfection	13	150	435	50	
4	Halewood's Bronze Top	12	700	411	40	
5	Jumbo	12	500	408	20	
6	Bangholm	11	950	382	30	
7	Green Top Sw. de	11	750	379	10	
8	Magnum Bonum	11	50	367	30	
9	New Century	10	1950	365	50	
.0	Canadian Gem	10	1300	355	00	
.1	Hartley's Bronze Top	10	750	345	50	
2	Corning's Lapland	10	750	345	50	
.3	Good Luck	9	1800	320	00	
. 1	Prize Purple Top	9	1650	327	30	
	Average	12	943	415	43	

ÁVERAGE YIELDS.

A number of the varieties recorded above have been grown at the Station for two years or more. Their average yield for the various periods will be seen from the following table:—

Variety.	Average.	Average Yield.			
	Years.	Ton.	Lb.	Bush.	Lb.
Hall's Westbury Hartley's Bronze Top. Jumbo Halewood's Bronze Top Bangholm Magnum Bonum. Good Luck. Perfection Mammoth Greystone Corning's Lapland. Prize Purple Top.	5 4 4 4 4 3 2	15 13 15 13 17 13 11 11 18 13	1051 1261 492 1866 1419 1184 1355 821 1663 1451 93	517 454 508 464 590 453 389 380 627 457 434	31 21 12 26 19 4 15 21 43 31 53

MANGELS.

Varieties of mangels were sown as usual, but a severe wind storm occurring just after they were thinned destroyed the crop. The storm moved fine particles of soil along the surface with such force that the young plants were completely cut off.

CARROTS.

Five varieties of carrots were tested. They were sown on summer-fallowed land on May 5. The germination was slow and poor. After being thinned many of the plants were destroyed and a very thin stand was therefore obtained. They were pulled October 26.

CARROTS.—Test of Varieties.

No. Variety.		er Acre.		
1 Giant White Vosges. 2 White Belgian 3 Improved Short White. 4 Ontario Champion. 5 Mammoth White Intermediate Average.	Ton. 1 1 0 0 1	Lb 750 120 60 1,750 1,500	Bush. 45 35 34 29 25 33	Lb. 50 20 20 10 0

SUGAR BEETS.

Five varieties of sugar beets were tested. They were sown on summer-fallow, April 30. As with the other roots, conditions were very unfavourable for obtaining a satisfactory stand. They were dug October 16.

SUGAR BEETS.—Test of Varieties.

No.	Variety.		Yield p	er Acre.	
4	Klein Wanzleben Vilmorin's Improved "B" Vilmorin's Improved "A" French Very Rich. Knight Sugar Company Selected. Average.	Tons. 9 9 9 8 8 8 9	Lb. 1,750 1,250 00 1,200 00 40	Bush, 329 320 300 286 266	Lb. 10 50 00 40 40 40

HAY.

The season was so dry that practically none of the fields or plots of perennial hay produced anything except the alfalfa grown in rows.

The results of the season's experiments only emphasize the conclusions given in last year's report that alfalfa must be planted in rows to allow intertillage if results are to be expected in a dry season. The distance the rows are apart appears to be an important consideration. Where the rows were less than 3 feet apart the plants did not make as much growth as could be desired. This was no doubt due to lack of moisture in the ground. It seems that a distance of 3½ feet between the rows ensures better results. This distance will also allow easy cultivation with ordinary corn machinery.

Unfortunately most of the alfalfa grown at the Station at present is planted less than 21 feet apart. Consequently the growth was much affected by the drought.

All the alfalfa was, this year, set aside for seed production. The yield was, however, very disappointing. In some cases the pods failed to fill. The best fields yielded at the rate of 80 pounds of seed per acre on the whole. The results of the experiments with alfalfa seed raising at the Station indicate that the best results will be obtained where the alfalfa is planted in rows 3½ feet apart.

THREE PERMANENT FORAGE CROPS.

There appear, at the present time, to be only three permanent forage crops, worth considering, for dry land farms. They are Alfalfa, Western Rye Grass, and Awnless Brome Grass.

Of these, alfalfa no doubt is the superior one.

Western Rye being of a bunch grass nature and not inclined to make a thick soil is better for hay than is Brome Grass. It should be cut soon after it heads out, otherwise it is apt to become woody and unpalatable to stock.

For pasture, Awnless Brome Grass is superior. Its couch or twitch-like habit, i.e., its inclination to spread rapidly from underground root stalks makes it, however, difficult to eradicate. This is especially true on rich, moist soils where it is really a most serious pest when once firmly established.

LETHBRIDGE.

PART II .- THE IRRIGATED FARM.

The yields of all kinds of forage crops on the irrigated land were very satisfactory. In fact, in some cases the results obtained were very good indeed. This was especially the case with corn. The yields of the roots were seriously affected on account of the difficulty in obtaining a stand, heavy winds drifting the soil and cutting off the young plants after they had been thinned. The yields from the alfalfa fields were good. The weather during harvest being dry, the quality of hay obtained was excellent. The yields of grasses such as Timothy, Western Rye Grass and Brome were relatively light owing to the extremely dry weather during May, when it was difficult to keep the surface of the land sufficiently moist for such shallow rooted plants.

INDIAN CORN.

As on the dry land the corn was grown for ensilage.

Thirteen varieties were tested. Part of them were planted May 13 and the balance May 27 in hills 3 feet apart each way on stubble land that had been manured the previous fall. The land was irrigated once on July 29, and the varieties cut on September 16. The yield of each variety was computed from 1/20 acre plots.

CORN.—Test of Varieties.

No.	Name of Variety.	Date of Sowing.	Stand.	Condition When Cut.	Average height.	Yield p	er Acre.
2 3 4 5 6 7 8 9 10 11 12	North Western Dent	" 27 " 13 " 13 " 27 " 13 " 27 " 13 " 27 " 13 " 13 " 13	- 86 59 89 92 92 71 60 35	Early milk . Late milk . Some well formed ears. "" Early milk . Nearing maturity Early milk . Milk stage. Near maturity Early milk . Almost mature . "" Average.	93 82 91 5 88 88 61 5 75 5 91 67 93 50 30	Tons. 26 / 24	Lb ₁ 200 700 50 1,150 900 1,700 1,000 800 400 650 1,400 1,000

^{*}Thinned by cutworms.

FIELD ROOTS.

TURNIPS.

Fourteen varieties of turnips were tested. They were sown April 30 on stubble land that had been manured in the fall of 1913. Unfortunately, hard winds destroyed most of the plants after they came up so that the varieties had to be partly re-sown. This was done on May 30. Aphides also did considerable damage, almost destroying the plants from the first seeding. The land was irrigated once, July 19, and the crop harvested October 15.

TURNIPS.—Test of Varieties.

No.	Variety.		Ýield p	er Acre.	
		Ton.	Lb.	Bush.	Lb.
1	Mammoth Greystone	21	750	712	30
2	Jumbo	12	500	408	20
3	Prize Purple Top	11	1,500	391	40
4	Canadian Gem	11	1,000	383	20
5	Perfection	10	1,500	358	20
6	Good Luck	10	1,000	350	00
6	Magnum Donum	9	1,500	325	00
8	Corning's Lapland	9 4	500	308	20
9	Hartley's Bronze Top	7	1,750	262	30
10	Green Top Swede	7	1,500	258	20
I	New Century	7	500	241	
12	Halewood's Bronze Top	6	1,250	220	50
3	Bangholm	6	500	208	20
i i	Hall's Westbury	5	500	175	00
	Average	9 .	1,732	328	- 52

AVERAGE YIELDS.

A number of the varieties recorded above have been grown two years or more. Their average yields for the various periods are as follows:—

Variety.	Average Years.	Average Yield.				
Bangholm. Jumilo Hall's Westbury. Hartley's Bronze Top. Good Luck. Perfection Halewood's Bronze Top. Magnum Bonum. Mammoth Greystone Prize Purple Top. Corning's Lapland.	5 5 5 5 3 2	Ton. 17 17 16 19 18 18 18 17 30 20 20	Lb. 1,857 1,703 1,598 1,886 1,390 842 714 589 1,750 1,125	Bush. 597 595 559 664 623 614 611 576 1,029 685	Lb. 37 3 58 46 10 2 54 29 10 25	

MANGELS.

Eleven varieties of mangels were tested. They were sown April 28, in rows 28 inches apart on land which had been manured the previous fall. Unfortunately, on account of lack of rain, the seed failed to germinate in due time. To ensure germination the land was irrigated on May 29. Owing to the late start, only a poor stand

LETHBRIDGE.

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was secured. The land was again irrigated on July 29. The crop was harvested on October 15 and the yield of the varieties, as recorded below, computed from one-fiftieth acre plots.

Mangels-Test of Varieties.

No.	Name of Variety.	Yield pe	Yield per Acre.			
		р. с.	Ton.	Lb.	Bush.	Lb.
1	Prize Mammoth Long Red	68	27 27	1,000 250	916 904	. 40 10
2	Giant Yellow Intermediate	73 70 -	26	750	879	10
3	Danish SludstrupGate Post	78	26	750~	879	10
4	Yellow Leviathan	70	25	1,750	862	30
6	Selected Yellow Globe	63	25	750	845	50
7	Perfection Mammoth Long Red	73	24	1,000	816	40 40
8	Mammoth Long Red	70	23	1,500 500	791 675	40
9	Half Sugar White	58 58	19	750	645	50
10	Giant Yellow Globe	50	16	500	541	40
11	Average		23	1,773	796	13

AVERAGE YIELDS.

A number of varieties have been tested for periods ranging from two to seven years. Their average yields for the periods in question are recorded in the following table:—

Variety.	Average Years,			Average Yield.		
Giant Yellow Intermediate Selected Yellow Globe Terfection Mammoth Long Red Giant Yellow Globe Gate Post Prize Mammoth Long Red Half Sugar White Golden Tankard Danish Sludstrup Yellow Leviathan Mammoth Long Red	77 77 76 66 63 22 23	Ton. 20 19 19 18 22 20 20 13 23 22 19	Lb. 1,015 1,547 725 1,869 488 928 314 1,675 162 1,088 1,312	8ush. 683 659 645 631 741 682 671 461 769 751 655	Lb. 35 7 25 9 28 8 -54 15 22 28 12	

CARROTS.

Six varieties were tested. They were sown April 30 and, as was the case with other roots, had to be irrigated to ensure germination. They were sown on stubble land that had been manured the fall before, in rows 28 inches apart. They were thinned to about 6 to 8 inches apart in the rows. The land was again irrigated on July 29. The crop was harvested October 26.

CARROTS-Test in Varieties.

o. Name of Variety.		Yield per Acre.					
		Ton.	Lb.	Bush.	Lb.		
1 In	mproved Short White	19 14	00 1,500	633 · 491	20 40		
3 M	Sammoth White Intermediate	14	500	475	-00		
G	Vhite Belgianiant White Vosges	12 11	1,000 500	416	40 20		
1	Average	14	700	478	20		

SUGAR BEETS.

Five varieties were tested. They were sown April 30 on stubble land that had been manured the fall before. They had to be irrigated, as was the case with the other roots. They were thinned to about 8 inches apart in the row. The land was irrigated July 29 and the crop harvested October 16.

SUGAR BEETS-Test of Varieties.

No.	Name of Variety.		Stand.		Yield per Acre.			
3 4	Vilmorin Improved "A" Klein Wanzleben. Prench Very Rich //ilmorin Improved "B" Knight Sugar Co. Selected.	89	or	Ton. 7 7 6 6 4	Lb. 1,250 50 1,000 600 1,000	Bush. 254 234 216 210 150	Lb. 10 10 40 00 00	
	Average			6	780	213		

ALFALFA.

The growing of hay on the irrigated lands in Southern Alberta is receiving more and more attention each season. This is particularly true in the Lethbridge district. Among the hays, Alfalfa will always rank first in importance.

Alfalfa is peculiarly adapted to irrigation. It produces large crops each year and is on the whole very profitable. The fact that a stand will last for many years reduces the cost of production to a minimum, the only expense attached to it being for irrigating and harvesting of the crop.

LETHBRIDGE.

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To get the best results the land should be irrigated for each crop or cutting. As the yield depends entirely on the care exercised in irrigating no parts of the field should be missed and no parts over-irrigated to such an extent as to cause injury to the crop.

The average yield per acre on the Station since 1909 (the first fields were sown in

1908) of field-cured hay has been slightly over 5 tons per acre.

Some tests have been made, during the last few years, to ascertain what quantity of seed should be sown to the acre. The results, as expressed by this year's yields, are tabulated below. They are in perfect accord with results obtained during previous years.

EXPERIMENTS WITH RATES OF SEED PER ACRE.

Rate of Seed per Acre.	Size of Plot.	Yield per Acre. First Cutting.	Yield per Acre. Second Cutting.	Yield per Acre. Third Cutting.	Total Y	
Lb. 5 10 15 20 25	1 0.90 0.90 0.93 0.84	Lb. 1,760 1,970 2,160 2,170 2,010	Lb. 2,920 3,150 3,190 3,360 3,570	Lb. 2,390 2,770 2,650 2,980 2,660	Ton. 3 4 4 4	1,070 1,880 510 240

The Station recommends 15 to 20 pounds of seed being used per acre. If conditions are very favourable less will do, but as alfalfa is a crop that will remain a long time on the land and one that will not thicken but rather is apt to become thinner as it becomes older, a liberal supply of seed is usually true economy. The hay from a thick stand has also finer stems and is therefore better in quality.

FIELDS OF ALFALFA.

Three fields of alfalfa yielded as follows:-

Area.	Date Cut.	Yield p	oer Acre.
11 acres	June 18-20. July 27-28 September 7-9	Ton. 1 1 1	Lb. 1,740 1,450 570
4	Total		1,760

Irrigated July 2, August 15, also in fall of 1913.

Area,	Date Cut.	Yield	per Acre.
2.76 acres	July 3		

Area.	'Date Cut.'	Yield per Acre.	
		Ton.	Lb.
2 22 acres	July 3 August 7 September 22.	2 1 0	1,130 1,160 860
	Total	4	1,150

Irrigated May 29, June 5 and July 12.

GRASSES AND MIXTURES.

A plot of 1 acre of Western Rye Grass, seeded in 1913, was cut on July 10 and yielded 1 ton 1,565 pounds. A plot of 1 acre of Brome Grass, seeded in 1913, was cut July 10 and yielded 1 ton 285 pounds. A plot of 1 acre of Timothy, seeded in 1913, was cut July 10 and yielded 1,725 pounds. A plot of 1 acre of Timothy and Clover, seeded in 1913, was cut July 10 and yielded 1,840 pounds. A second cutting of mature clover was cut September 22, from which a small quantity of seed was obtained by threshing with an ordinary grain thresher. Before June 6, these plots were irrigated twice.

A field of Timothy and Red Clover, size 1.005 acres, was cut July 10 and yielded 1 ton and 1,004 pounds per acre. A crop of mature seed was cut September 22, yielding at the rate of approximately 60 pounds per acre.

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

INDIAN CORN.

Twelve varieties of Indian corn were tested at Lacombe in 1914. The seed was planted on May 23, in hills two and a half feet apart each way. The land was ploughed out of sod in 1913, thoroughly packed, disced and harrowed in the fall and worked well in the spring before the planting of the seed. The season was favourable for corn, and the crop attained a height of about nine feet. The following table shows the varieties tested and the yield of each.

INDIAN CORN.—Test of Varieties.

No.	Variety	Date Sown.	Date Cut.	Yield per Acre
1 2 3 4 5 6 7 8 9 10 11 12	Golden Glow North Western Dent Salzer's North Dakota King Philip Minnesota No. 13 Free Press White Cap Yellow Dent Early Longfellow No. 28 Improved Sioux Squaw Canada Yellow. Free Press. Average.	11 29 129 129 129 129 129 129 129 129 12	" 1" " 1" " 1" " 1" " 1" " 1" " 1" " 1" " 1"	13 40 13 20 11 70 11 70 11 60

A block of two acres was planted with the Northwestern Dent and Longfellow varieties. This corn was sown in drills 28 inches apart and produced thirty tons of fodder, weighed green as it was being put into the silo. This yield is considerably larger than the yield of the same varieties grown in hills.

FIELD ROOTS.

An extremely heavy rain came just as the roots were showing above the surface, flooded the ground on which all the varieties of turnips, carrots and mangels were seeded and destroyed the erop on the entire area.

A two-acre block of turnips on higher ground produced forty-seven tons of roots of a splendid quality. The cost per ton placed in the root cellar was \$1.27. Since this crop was grown on breaking of the previous year there were few weeds to combat, and the cost is therefore low on that account.

TIMOTHY FOR SEED AND FOR HAY.

Timothy supplied by the Central Experimental Farm was sown in the spring of 1913 in five duplicate plots. Five were cut for hay on July 29, and five for seed on August 17. Little difference was noticed in the earliness of these different strains of timothy, but the season just prior to cutting was particularly hot and may have forced all varieties abnormally.

Plot No.	Cut for Hay.	Cut for Seed.'	Yield of Hay per Acre.	Yield of Seed per Acre.	
1	July 29	August 17	Ton. – Lb. 3 1,200 3 960 3 960 3 640 3 480	Bush, Lb. 8 50 13 40 12 40 15 20 14 30	

RED CLOVER FOR HAY AND SEED. .

Five selections of red clover were sown in duplicate in 1913, and were tested for hay and seed values in 1914. The quantity of the seed produced was negligible, and though there was an occasional seed the amount was so very small that it was considered not worth while to thresh. The yield of hay is shown herewith:—

Plot No.	Date Cut.	Yield per Acre.	
1	July 20	Ton, Lb. 1 1,440 -1 1,440 -2 240 2 1,040 2 960	

TIMOTHY: RATE OF SEEDING PER ACRE.

An experiment to determine the proper rate of seeding of timothy per acre, with and without a nurse crop, was begun in 1913. The plots sown produced their first crop of hay in 1914. The results show an increased yield of hay when timothy is seeded without a nurse crop, but not sufficient to pay for the loss of the previous year's crop. The advantage of light seeding is demonstrated:—

TIMOTHY Without Nurse Crop.

Plots	Rate of Seeding.	Date Cut.	Total Yield.	
			Ton. Lb.	
Plot 1	5 pounds	July 29	3 480 3 80 3 800	

LACOMBE.

TIMOTHY With Nurse Crop.

Plots.	Rate of Seeding.	Date Cut.	Total Yield.	
			Ton. Lb.	
Plot 1	5 pounds	July 29	2 880 2 320 2 320	

ALFALFA.

A test was begun in 1913 to determine the comparative yields of alfalfa seeded in drills 28 inches apart as compared with being sown broadcast in the usual manner. The seed used was produced by the Experimental Station, Lethbridge. In this test, as in a previous one begun several years ago, the alfalfa produced from seed from this source has proven altogether hardy.

Variety.	Grade.	How Sown.	Area.	1st Cutting, July 22.		2nd Cutting, Sept. 4.		Total Crop.	
Grimmv	A B	Broadcast		1	Lb. 250 330	Ton.	Lb. 620 980	Ton.	Lb. 870 1,310
H	A B	Drills 28 in. apart.	·58 "	0 1 0 1	,310 ,470	0	1,080 1,130	1	390 600

PEAS AND OATS FOR FORAGE.

Each year large areas of land at this Station are devoted to the growing of peas and oats sown together at the rate of one bushel of peas and two bushels of oats to the acre. This seeding is done as soon as possible after the crop intended for threshing has been sown. Large yields of this mixture have been secured and the combination has proven very satisfactory as a forage crop. Last season one and a half acres produced nineteen tons, green weight, when weighed over the scales preparatory to being put into the silo. Whether the fodder is preserved in the silo, or whether it is cured in the shock, stacked, put through the cutting box and fed, the quality and quantity secured from a given area is satisfactory.

The results of a number of feeding trials conducted during the past winter seem, however, to indicate that the ensilage secured from the mixture cut green is superior as far as feeding value is concerned, to the fodder cured in the field and fed dry. By feeding ensilage to the dairy cows the cost of production of a pound of butter has been found to be twenty per cent less than when field cured fodder fed dry is used. Where fodder is required for dairy cattle the silo will therefore provide the most profitable means for its storing.

Whether the crop is intended for ensilage or for making field cured fodder, it should be cut when the oats are in the milk stage.

After having visited the Farm and inspected the silage as it was being fed to dairy cattle at this Station during the past winter, a number of dairymen have expressed themselves as being so favourably impressed with the advantage of the silo that they intend to provide for storing their green feed crop in this manner next year.

LACOMBE.

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

SEASON.

This season has been different from the average inasmuch as a very severe drought was experienced in June, July and August. The early season was sufficiently moist, and all forage crops, (except corn) made excellent growth until the latter part of June. From the end of June until the second week of September all the crops suffered from lack of moisture.

Taking the growing season as a whole, there was a generous supply of moisture (23.3 inches) but it was badly distributed, as the following table will show. There were not any very high temperatures but neither were there any frosts from May 1 until October 31.

1914.	May.	June.	July.	August.	September.	October.	Total.
PrecipitationSunshine	3 55 in. 202 hrs.	5 18 in. 176 hrs. 18 min.	'0'15 in. 246 hrs. 30 min.	0.60 in. 224 hrs. 30 min.	6·29 in. 60 hrs. 30 min.	7 53 in. 111 hrs. 30 min.	23 3 in. 1,021 hrs. 42 mirs. Average.
Highest temp	85° 36° 56·28°	87° 41° 52°91°	87° 39° 62`075°	87° 44° 62 995°	78° 40° 54·23°	71° 34° 50·4°	\$2.5° 39° 56 48°

SOIL

The soil on which the forage crops were grown this year was a sandy loam which was not very fertile. It had been in pasture in 1913 and during that season grew a very thick crop of rye grass and white clover.

MANUERING

The land upon which all the forage crops were grown was manured during the winter and early spring with 20 tons of barnyard manure per acre.

The mangels, turnips, sugar beets and carrots received, in addition, 700 pounds per acre of the following mixture:—

150 pounds muriate of potash.

100 pounds nitrate of soda.

350 pounds superphosphate.

This mixture was applied in the drills at the time of planting. The corn did not receive a dressing of commercial fertilizer.

INDIAN CORN.

Nine varieties of corn were tested this year. They were all planted on May 15 and barvested September 30, thus having a growing season (without frost) of 138 days. The yield was lighter than usual this year. One of the reasons for this was that the land was not worked in the best way prior to seeding. It was given a surface

application of manure in late winter and early spring. The sod was then spring ploughed, rolled and top-worked. With this treatment it was found most difficult to get a proper seed bed, and the crop suffered. Another reason for the low yield was that the season, as will be noticed from the weather report, was cool and dry at that time of year when corn makes its greatest growth.

The seed was planted in hills three feet apart each way. Six seeds were put to each hill, but only an average of two stalks per hill grew to maturity. This number is far from enough for a large tonnage and compares very unfavourably with the average

from previous years which is four mature stalks to the hills.

Early Longfellow and Compton's Early gave as usual the best silage returns, yielding 13 tons 1,400 pounds and 13 tons 700 pounds per acre respectively. They both reached the soft dough stage in maturing. White Cap Yellow Dent yielded 500 pounds more per acre than Longfellow but the grain was only in the early milk stage. The whole crop was softer and made very watery silage. Free Press ripened and Canada Yellow was nearly ripe, but both varieties were extremely light croppers. Wisconsin No. 7 and King Philip both finished in the soft dough stage, but they were lighter croppers than Longfellow and Compton's Early. Golden Glow and Salzer's North Dakota were of very inferior quality and light yielders this year.

INDIAN CORN FOR ENSILAGE—Test of Varieties.

No.	Name of Variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when Cut.	Yield per Acr
2 3 4 5 6 7	Early Longfellow White Cap Yellow Dent. Compton's Early. Wisconsin No. 7 King Philip Salzer's North Dakota. Golden Glow Canada Yellow Free Press Average	" 15 " 15 " 15 " 15 " 15 " 15	" 30 " 30 " 30 " 30 " 30	90 88 92 86 80 84 66	Soft dough Early Milk. Soft dough. " " Few ears formed. Nearly ripe. Ripe.	11 1,400 10 1,450 9 300

FIELD ROOTS. .

TURNIPS.

Sixteen varieties of turnips were grown this year. They were planted on May 9 and harvested November 14, thus having a growing season of 189 days. The land which was in pasture last year received the preparation which, at the present time, is considered best for root crops. It was ploughed in early autumn, rolled, top-worked with disc and drag, and later in the autumn reploughed deeper than the first time. The manure was applied in early spring and worked in with the disc harrow. The land was drilled up in rows 30 inches apart. It was then rolled and the seed planted three-quarters of an inch deep at the rate of 4 pounds per acre. The stand was perfect and there was little or no trouble with the cabbage maggot. In the dry weather in August there was a very bad attack by an aphis; this scourge lasted until the rains came in September. It did a great deal of damage and the result was a smaller crop of poor quality. The aphis in nearly every case destroyed the crown, and when growth was resumed, each turnip was many headed. This season there was also quite a large percentage of rotten turnips, possibly due to the mid-summer check in growth.

This season a variety named Perfection headed the list as the heaviest yielder with 30 tons 400 pounds per acre; it was followed closely by Hall's Westbury, which yielded 29 tons 1,900 pounds. The third variety was Bangholm, the seed of which was received through the courtesy of Mr. V. Bojesen, Victoria, B.C., from the Danish Seed Commissioner. Another variety named Fyen Bortfelder, received from the same source as the Danish Bangholm, matured early and should have been used as a fall turnip, because when harvested on November 14, it had a very large percentage of rotten roots. It is a long mangel-shaped turnip which grows very high out of the ground, and when sound shows a clean, smooth, prongless root.

TURNIPS-Test of Varieties.

No.	Name of Variety.	Yield per Acre,				
13 14	Perfection Hall's Westbury Danish Bangholm New Century Hazard's Improved Green Top Hartley's Bronze Top Danish Green Headed Swede Magnum Bonum Corning's Lapland Bangholm Good Luck Jumbo Halewood's Bronze Top Canadian Gem Mammoth Clyde	29 29 28 28	Lb. 400 1,900 800 1,900 1,800 1,800 1,800 1,800 1,000 400 1,000 800 1,400 1,600 900	Bush. 1,006 998 980 965 963 963 948 945 941 940 916 913 890 860	Lb. 40 20 00 00 20 20 20 40 00 40 20 00 00 00 00 00 00 00	
16-	Fyen Bortfelder	21	100	. 781 . 701	40 40	
	Average	27	1,181	919	41	

Taking into consideration the tests made each year at this farm, it is very hard to recommend any one variety as being the best suited for the local conditions. During the last ten years, Perfection has twice headed the list; this can also be said of Jumbo. Magnum Bonum was once first and once second; Good Luck has also been once first and once second. Kangaroo and Halewood's Bronze Top have each twice been in second place, while Carter's Elephant has the distinction of being once at the top and twice in second place, from the standpoint of gross yield per acre. This may be better illustrated in the following table:— ``

No.	Name of variety.	No. of times appearing as highest yielder in ten years.	No. of times appear- ing as 2nd highest yielder in ten years.
3 4 5 6	Carter's Elephant. Perfection. Jumbo. Magnum Bonum. Good Luck Kangaroo. Halewood's Bronze Top	2 2 1 1	1 1 2 2 2

Figuring from this table it may be concluded that Carter's Elephant would be the post variety, with Jumbo and Perfection next best. However, there is room for very careful work in this particular branch of work in the near future.

MANGELS.

Twelve varieties of mangels were grown this year. They were planted on May 8, and harvested November 12, the growing season thus being 187 days. They were planted on the same kind of soil and received the same treatment previous to planting as did the turnips; in fact all the root crops were treated alike in this respect. The mangels were planted in rows 30 inches apart and thinned to 14 inches in the rows. The seed was set about one inch deep and planted at the rate of 10 pounds per acre. Even with this amount of seed, the stand was not perfect. After the roots were an inch in diameter they were badly attacked by cutworms and as a result the crop was seriously affected. The attack of the cutworms accounts for a lighter crop this year than usually.

A certain strain of Yellow Globe gave the largest yields. This strain is always near the head of the list at this farm. The Sludstrup gave a very good yield, and roots of excellent quality were produced. The Mammoth Long Red and the Gate Post gave comparatively good yields but the crop was a rough, prongy one.

A trial was again made this year with commercial fertilizer for mangels. Three plots were used; one plot did not have any commercial fertilizer; one plot had a complete dressing of commercial fertilizer and one had a dressing of nitrate of soda and superphosphate. The results are shown in the following table.

Plot No.	Treatment.	Yield p	er acre.
1 2 3	No commercial fertilizer	Ton. 4 25 22	Lb. 69 90 30

More extensive and thorough work is being arranged in an endeavour to find out which fertilizer constituent is most beneficial and what quantity of fertilizers should be applied for the most profitable returns of the mangel crop in the district.

Mangels .- Test of Varieties. .

No.	Name of variety.	Yield p	er acre.	Yield per acre.	
3 4 5 6 7 8 9 10	Giant Yellow Globe "Intermediate. Danish Sludstrup Prize Mammoth Long Red Yellow Leviathan Gate Post Danish Rosted Barres. Perfection Mammoth Long Red. Mammoth Long Red. Giant Half Sugar White. Selected Yellow Globe. Golden Taukard.	23 22 21 20 20 19	Lb. 1,000 700 300 100 1,500 200 00 1,800 1,600 300 700	Bush. 850 778 771 735 726 691 670 633 630 626 605 411	Lb. 00 20 40 00 40 40 00 20 00 40 40 40 30

Storage Test of Mangels.—Stored from November 13, 1914, to April 1, 1915 (140 days).

Number of roots.	Variety.	Weight when stored.	Weight when taken out.	Unsound roots.	Per cent loss by shrinkage.	Per cent unsound roots.
		Lb.	Lb.	Lb.	p.c.	p.c.
	Giant Yellow Intermediate	252	232	3	7.9	1.15
50	Giant Yellow Globe	272	253	2	7.0	0.7
50	Danish Sludstrup	_ 220	199	* > * * * * * * * * *	9.0	1
50	Prize Mammoth Long Red	252	223		. 11.5	
50	Mammoth Long Red	226	212		6.2	· · · · · · · · · · · · · · · · · · ·
50	Gate Post	232	213	50500,0000	8.2	
50	Selected Yellow Globe	310	260	10	16.1	3.2
อบ	reliow Leviathan	269	237		11.9	*******
50 50	Giant Half Sugar White	235			9.8	
50	Perfection Mammoth Long RedGolden Tankard	222	191		14.0	
	Danish Rosted Barres.	190 238	170 218		10·5 8·4	2:0

CARROTS.

Five varieties of carrots were planted on May 8 and harvested November 14.

This season the field carrots out-yielded all other classes of field roots. The highest yielding varieties produced 32 tons 1,600 pounds per acre. On the whole the carrots grew very large and many of them cracked badly. They were therefore harvested in such condition as to make storing and keeping in a cellar difficult. The Improved Short White, although not yielding as much as Giant White or White Belgian, gave a carrot of superior quality.

CARROTS-Test of Varieties.

No.	Name of Variety.	Yield	per Acre.	Yield pe	r Acre.
2 3 4	Giant White Vosges	Ton. 32 27 26 25 24	Lb. 1,600 1,600 1,900 1,900 900	Bush. 1,093 926 898 835 815	Lb. 20 40 20 00 00

6 GEORGE V, A. 1916

SUGAR BEËTS. *

Four varieties of sugar beets were planted May 8 and harvested November 14. The highest yielder was French Very Rich, which gave 14 tons 1,900 pounds per acre. On the whole the roots were rough and the yields not satisfactory this year.

Sugar Beets-Test of Varieties.

No.	Name of Variety.	Yield	per Acre.	Yield p	er Acre
,	French Very Rich	Ton. 14 12 12 9	Lb. 1,900 1,700 200 1,900	Bush. 498 428 403 331	Lb. 20 20 20 40
•	Average	12	925	415	2 5

EXPERIMENTAL STATION, INVERMERE, B.C.

REPORT OF THE SUPERINTENDENT, G. E. PARHAM.

CHARACTER OF SEASON.

The rainfall during the last season was above the average. Forage crops, especially corn, suffered from the unfavourable conditions in June, being retarded in their growth by the cold. The month of August was very dry but the lack of moisture was made good by a late irrigation. A frost on August 31 cut the corn foliage, but the root crops continued their growth up to the time of harvesting, viz., October 15. The rainfall in September was 2·16 inches but October was dry, and the harvest of the root crops was conducted under favourable conditions.

INDIAN CORN.

The seed was sown on June 6 on land which had grown a crop of oats in 1912, followed by vetches and rape, ploughed under, in 1913. In the spring of 1914, manure at the rate of 12 tons per acre was applied in furrows 3 feet apart. Owing to the cold winds and low temperature in June, the seed was slow in germinating, and the corn made but slow growth until the warm weather in July. No cobs matured.

During the season the land was twice irrigated, once hand-hoed and twice cultivated with a one-horse cultivator.

INDIAN CORN FOR ENSILAGE—Test of Varieties.

No.	Variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when Cut.	Yield per Acre.
2 3 4 5 6	Salzer's North Dakota	н 6 н 6	Sept. 8 " 5 " 5 " 5 " 5 " 8	Inches, 36 36 36 30 30 30 30	Green	Ton. Lb. 4 970 4 610 3 1,770 3 30 2 1,660 2 1,480 1 870

The weights were taken after the corn had been somewhat injured by frost.

FIELD ROOTS.

Sixteen varieties of turnips, eleven of mangels, four of sugar beets and five of carrots were tested.

The treatment of the land for all these was the same. The land was ploughed in the autumn of 1913 and again ploughed, cultivated and levelled in the spring. A dressing of farm manure at a rate of 12 tons to the acre was then applied, and the land again ploughed and levelled.

TURNIPS.

The seed was sown May 19 on the flat. Plots one-sixteenth of an acre to each variety. The drills 2 feet apart and plants about 1 foot apart in the rows.

Turnips.—Test of Varieties.

No.	Variety.	Y	ield pe 1st F	er Acre	3,	. Y	ield po	er Acr Plot.	е,	A		Yield	
2 3 4 5 6 7 8 9 10 11 12 13 14 15	Carter's Imperial Invicta Hall's Westbury. Magnum Bonum. Pertection Italewood's Bronze Top. Mammoth Clyde. Hartley's Bronze Top. Canadian Gem. New Century Hazard's Improved Bangholm Cenning's Lapland. Prize Purple Top. Good Luck Jumbo	Ton. 25 21 19 22 19 21 17 17 17 15 14 21 15 16 17 13	Lb. 1,280 40 1,270 1,870 1,270 1,430 1,570 1,240 810 406 240 1,220 1,550 1,660 450 70	700 654 764 654 723 592 587 646 473 704 520 525 561 574	Lb. 40 40 30 30 50 50 20 60 20 60 60 60 60 60 60 60 60 60 60 60 60 60	Ton. 18 20 20 15 18 16 20 18 15 20 13 18 16 16 16 15	Lb. 1,620 1,050 130 1,550 1,880 1,550 1,880 500 1,680 1,710 1,420 890 1,460 600 1,680	627 684 668 525 631 547 677 608 528 528 695 440 623 614 557 543 528	00 10 50 50 20 50 40 20 00 10 00 40 50 40 20 00	22 20 19 19 19 19 19 17 17 17 17 17 16 16 14	450 1,545 1,700 910 575 150 115 1,870 1,245 1,055 320 220 1,560 1,525 875	740 692 661 644 642 635 635 597 587 572 570 559 558 481	50 25 40 50 55 50 15 50 25 15 00 00 20 20 45 15
	Average	18	1,398	623	.18	17	1,631	593	51	18	514	608	34

MANGELS.

The seed was sown May 19 in plots 1/66 acre in size. The drills were two feet apart and the plants thinned to about one foot in the rows. The land received the same treatment as to cultivating and manuring as that used for turnips. Yet the total yield per acre of mangels was less than one-half of that of turnips.

Mangels.—Test of Varieties.

No.	Variety.	Y	ield pe 1st F	er Acr	ŧ.	Y	ield p 2nd	er Acr Plot.	·e.	A	verag	e Yield Acre.	3
2 3 4 5 6 7 8 9	Danish Sludstrup Yellow Leviathan Ginnt Yellow Globe Perfection Mammoth Long Red. Mammoth Long Red. Giant Half Sugar White Prize Mammoth Long Red. Giant Yellow Intermediate. Gotte Post. Golden Tankard Selected Yellow Globe.	10 9 8 9 8 9 8 8 8	Lb. 1,910 480 1,420 1,600 1,560 20 1,090 1,160 370 240 1,840 1,790	308 290 326 292 300 284 286 272 270 264	Lb. 10 60 20 40 40 20 50 00 50 40 00	Ton. 9 9 7 8 8 8 8 8 8 8	Lb. 1,800 1,460 1,600 1,640 1,090 40 900 630 1,290 1,230 1,030	330 323 326 260 284 267 281 277 288 287 283	Lb. 00 20 40 40 50 20 10 10 50 50 54	10 9 9 3 1 8 1 8 8 8 8 8	Lb. 855 940 510 1,620 1,325 1,030 995 895 830 735 435	Bush. 347 315 308 293 288 283 283 281 280 278 273	Lb. ; 5 40 30 40 45 50 15 35 30 55 55

CARROTS.

The seed was sown on June 19 on the flat. Plots one-thirty-fifth of an acre with drills 2 feet apart, plants 4 inches apart in the rows. The land was twice hand hoed, and twice cultivated with a one-horse cultivator.

CARROTS.—Test of Varieties.

No.	Variety.	Yield 1	piot.	,	Y	ield p 2nd	er acre	,			ge yiel acre.	,
2 3 4	White BelgianOntario ChampionGiant White Vosges Manmoth White IntermediateImproved Short White:	6 - 360 6 1440 4 1870 5 1690	Bush. 206 224 164 194 192 196	Lb. 00 00 30 50 00 16	Ton. 7 6 7 6 6 6 6	Lb. 810 500 1650 460 390	Bush. 246 208 260 207 206 226	Lb. 50 20 50 40 30	Ton. 6 6 6 6 5	Lb. 1585 970 760 75 1955	Bush. 226 216 212 201 199 211	Lb. 25 10 40 15 15

SUGAR BEETS.

The seed was sown May 19 on the flat. Plots one-sixty-sixth of an acre each. Drills 2 feet apart and plants 10 inches to 1 foot apart in the rows.

SUGAR BEETS.—Test of Varieties.

No.	Variety.	Y	ield p	er acre	÷,	Y	ield p	er acr	e, -	2		yiek acre.	l, ,
1 2 3 4	French Very Rich	7	Lb. 1800 1270 1490 1050 1403	330 321	00 10 10	Ton. 7 7 7 7 7 7	Lb. 650 850 1460 650 903	Bush. 244 247 257 244 248	Lb. 10 30 40 10 23	Ton. 8 8 7 7 7 8	Lb. 1225 1060 1475 850	Bush. 287 284 257 247 269	Lb. 5 20 55 30 13

LEGUMINOUS FORAGE PLANTS AND GRASSES.

Duplicate plots of one-eightieth of an acre each were sown in June with:-

Kentucky Blue Grass, Red Toy). Meadow Fescue. Orchard Grass. Timothy. Western Rye Grass. Red Clover. Alsike Clover, Sainfoin, Alfalfa.

All of the varieties made a good start and have withstood the winter conditions well.

EXPERIMENTAL STATION, FORT VERMILION, ALTA.

REPORT OF MANAGER, R. JONES.

INDIAN CORN.

Six varieties of Indian corn were tested this year. They were planted on May 4 in hills 2½ by 3 feet apart on land which was in summer-fallow 1913. The plots which were one-thirtieth acre in size were cultivated a number of times to encourage the growth and to prevent the evaporation of moisture from the soil during the very dry spell in May and part of June. The plots were cut on September 10 with the following results:—

INDIAN CORN.-Test of Varieties.

No.	Variety.	Average Height.	Condition When Cut.		ield Acre.
2 3 4 5	King Philip Early Canada Angel of Midnight Longfellow Salzer's North Dakota. Compton's Early.	60 68	In silkEarly milk	Ton. 20- 19 19 18 17 16	Lb. 1,280 1,370 880 1,000 320 1,400 1,375

FIELD ROOTS.

All field roots were grown on land which had been in potatoes in 1910, wheat in 1911, oats 1912, and summer-fallow in 1913. All plots were one-sixtieth of an acre.

TURNIPS.

Four varieties of turnips were sown in drills 24 inches apart on May 11. The plants were thinned to one foot apart in the drills. The land was thoroughly cultivated a number of times with the hand hoe. On account of the drought in the early summer, the yield was somewhat below the average. The yield was also influenced by a severe attack of insects in May which necessitated re-seeding of several plots. The affected varieties were re-sown on May 30.

The plots were harvested on September 12.

TURNIPS.—Test of Varieties.

No.	Variety.		Yield p	er Acre.	
3	Perfection	Ton. 20 19 17 15	Lb. 80 1,600 1,400 1,760 710	Eush. 668 660 590 529 611	Lb. 00 00 - 00 20 50

· MANGELS.

Four varieties were sown on May 9, in drills 24 inches apart. The plants were thinned to one foot apart in the rows. The plots were harvested on September 18.

Mangels.—Test of Varieties.

No.	Variety.		Yield	per Acre.	
	·	Ton.	Lb.	Bush.	Lb.
2 3	Giant Yellow Intermediate Giant Yellow Globe Gate Post Prize Manmoth Long Red.	36 32 20 20	520 840 1,800 240	1,208 1,080 696 670	40 40 40 40
	Average	27	850	914	.10

CARROTS.

Four varieties were tested. They were sown on May 9 in drills 20 inches apart and the plants thinned to about 5 inches apart in the rows. Harvesting took place on September 15.

CARROTS -Test of Varieties.

Īo.	Variety.		Yield pe	or Acre.	
	-	Ton.	Lb.	Bush.	Lb.
3	Mammoth White Belgian. White Belgian. Ontario Champion. Half-long Chantenay.	36 31 26 24	960 280 920 1,720	1,216 1,038 882 828	00 00 00 40
	Average	29	1,470	991	10

SUGAR BEETS.

Two varieties were sown, on May 9, in drills 24 inches apart. The plants were thinned to about one foot apart in the rows. Harvesting took place on September 17.

SUGAR BEETS-Test of Varieties.

No.	Variety.		Yield 1	per Ácre.	
1	Vilmorin Improved	Ton. 22	Lb.	Bush. 752	I.b.
2	Vilmorin Improved	21	1.640	702	20

LEGUMINOUS FORAGE PLANTS AND GRASSES.

Alfalfa.—Four varieties, viz.: Montana, Sand Luzerne, Grimm's and Ontario Variegated, were sown on May 2. The plots were cut on July 16 and yielded as follows:—

variety.	Yield	per Acre.
	Ton.	Lb.
1 Ontario Variegated	1 1 1 1	1,050 600 400 300
Average	`1	£88

The above plots were cut a second time in the latter part of September and the cutting left on the ground to act as a mulch for the protection of the roots.

Two other plots of alfalfa were sown on June 8. On account of the ground being very dry at the time of sowing the germination was somewhat slow. After the rains in the early part of July, however, the growth was progressing rapidly. The plots were clipped in September and the clippings left on the ground for winter protection.

Sainfoin.—One plot of Spanish sainfoin, sown in 1913, yielded, when cut on July 16, at a rate of 1,800 pounds to the acre.

Red Clover.—A small plot of Red Clover was sown on June 5. It entered the winter in very good condition.

Grasses.—Plots of Timothy, Western Rye Grass and Awnless Brome Grass were sown in the spring of 1913 with a nurse crop of oats. They were cut on July 15 and yielded as follows:—

No.	Variety.	Yjeld per Acre	
2	Awnless Brome Grass. Western Rye Grass Timothy	Tons Lt 2 1,50 2 1,00 1 1,50	00

A plot, one-sixticth of an acre in size, was sown on May 16 to Canary grass. It was cut on August 11 and yielded at a rate of 2 tons 1,400 pounds to the acre.

Red Top, Kentucky Blue Grass, Meadow Fescue, Western Rye Grass, Awnless Brome Grass and Orchard Grass were sown, on June 8, in plots one-eighth of an acre in size. They were sown with a nurse crop of oats which was cut as green feed on August 12. At the end of the growing season, the stand of all varieties was rather unsatisfactory.

DOMINION OF CANADA DEPARTMENT OF AGRICULTURE DOMINION EXPERIMENTAL FARMS

REPORT

FROM

THE POULTRY DIVISION

For the Year Ending March 31, 1915.

PREPARED BY

1e	Dominion Po	ultry H	lusbandi	man,	Ottaw	a.	•	* :	-	-	•	-	F. C. Elford.
ıp	erintendent—												
	Experimental	Station	, Charlo	ttetov	vn, P.	Ε.			-	-		-	J. A. Clark, B.S.A.
	Experimental	Farm,	Nappan,	N.S.	- m - 1m	-		-	-	-		-	W. W. Baird, B.S.A.
	Experimental	Station	, Kentv	ille, N	.s		40			-			W. S. Blair.
	Experimental	Station	, Freder	icton,	N.B.		-		un.			-	W. W. Hubbard.
	Experimental	Station	, Cap R	ouge,	Que.	-	-	**	-			•	G. A. Langelier.
	Experimental	Farm,	Brandon	n, Ma	n	-	-	-	*		-	٠,	W. C. McKillican, B.S.A.
	Experimental	Farm,	Indian	Head,	Sask		-		-		-	-	K. Macbeen, B.S.A., Asst
	Experimental	Station	, Lethbr	idge,	Alta.	-	÷	•			-	-	W. H. Fairfield, M.S.
	Experimental	Station	, Lacon	nbe, A	lta.			-		e'	-	-	G. H. Hutton, B.S.A.
	Experimental	Farm,	Agassiz,	B.C.		-	-			-	-	-	P. H. Moore, B.S.A.
	Experimental	Station	, Inver	nere,	B.C.		-			-		۰	G. E. Parham.



REPORT FROM THE POULTRY DIVISION.

The Director,

Dominion Experimental Farm

Ottawa, Ont.

Sir,—I have the honour to transmit herewith the twenty-eighth annual report of the Poultry Division. Included in this is a short account of conditions that prevailed throughout the greater part of the year; the experimental work conducted by the Poultry Division at the Central Experimental Farm and the eleven Branch Farms and Experimental Stations at which there are kept poultry. These latter reports are prepared by the following Superintendents: J. A. Clark, B.S.A., Experimental Station, Charlottetown, P.E.I.; W. W. Baird, B.S.A., Experimental Farm, Nappan, N.S.; W. S. Blair, Experimental Station, Kentville, N.S.; W. W. Hubbard, Experimental Station, Fredericton, N.B.; G. A. Langelier, Experimental Station, Cap Rouge, Que.; W. C. McKillican, B.S.A., Experimental Farm, Brandon, Man.; K. Macbean, B.S.A., Assistant to the Superintendent, Experimental Farm, Indian Head, Sask.; W. H. Fairfield, M.S., Experimental Station, Letchbridge, Alta.; G. H. Hutton, B.S.A., Experimental Station, Lacombe, Alberta; P. H. Moore, B.S.A., Experimental Farm, Agassiz, B.C., and G. E. Parham, Experimental Station, Invermere, B.C.

There is also an account of a lecturing trip taken by Mr. Fortier to the north shore

of the Gulf of St. Lawrence.

During the year eight circulars of the Exhibition Series have been prepared and published, while several bulletins are in process of preparation.

The applications for lectures and judging have increased to such an extent that many of the requests for lectures and most of those for judging have had to be refused.

Poultry work has not been started at any new Farms this year, as it was deemed wiser to get the eleven that were already started fairly well established before others were included. The stock at each of those Farms already keeping poultry has been materially increased and the aim is to have on each at least 300 laying hens of which 200 will be pullets and 100 breeding hens.

The stock at the Central Farm has more than doubled in the year and includes

good specimens of turkeys, geese and ducks as well as ordinary fowl.

I have the honour to be, sir, Your obedient servant,

F. C. ELFORD.

Dominion Poultry Husbandman.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

REPORT OF THE DOMINION POULTRY HUSBANDMAN, F. C. ELFORD.

CONDITIONS PREVAILING THIS YEAR.

The past year was remarkable in that because of the unsettled state of trade, prices for produce were very uncertain and generally low, while the cost of feed that producers had to buy was high. In many cases producers complained that the cost of production was more than the produce would bring when sold, and it is quite possible this fact was responsible for the sale last fall of many pullets that should have been retained for winter egg production.

The season of high priced feed and low priced product will not be an unmixed evil if it will induce poultrymen to introduce business principles into their operations and to study how to produce at less cost and how to market to better advantage

to themselves as well as with more satisfaction to the consumers.

Low prices help consumption and indirectly assist the producer. Last fall and winter when dressed poultry was low, many families who had hardly tasted poultry for years, had it on their tables. The same is the case with fresh eggs, and at least some of these families, having acquired a taste for it, will continue to eat poultry produce even when the prices are higher.

GREATER PRODUCTION IS NEEDED IN CANADA.

Canada is not raising enough poultry and eggs to feed herself. At one time she was an exporting country, now it is necessary to import both eggs and poultry to supply the local demand. In the year 1901, she exported 11,363,064 dozen of eggs, and imported 951,745 dozen. In the year 1914, 11,274,108 dozen of eggs were imported and 124,002 dozen were exported, and \$200,000 worth of poultry dead and alive was imported in excess of the value exported.

It might be interesting to know just where these imported eggs came from, and also where the few eggs that were exported went to. Of the imports, 10,795,682 dozen came from the United States, 406,562 dozen from China, 60,407 dozen from Hong Kong, 10,320 dozen from New Zealand, 790 dozen from Great Britain, and 275 dozen from Japan. Of the few that were exported, the United States got 62,273 dozen, Newfoundland 44,789 dozen, St. Pierge and Miquelon 13,798 dozen, Bernuda 2,562 dozen and British Oceana 580 dozen.

The fact that Canada is yearly going behind in supply, however, is not because her poultry population is decreasing, for there were in 1911 more hens per capita than ever. The truth is, Canadians are eating more eggs every year, and if we continue to improve the quality of eggs that go on to the consumer's table, it is quite

likely that the average consumption will increase still further.

It looks as if Canada must increase her egg production or still go hungry for these products, and the probabilities are that next year will see fewer eggs produced in Canada than has been the case for several years past. The high price of feed last fall and the comparatively low price of market poultry meant that a number of laying hens were killed before winter set in.



Fig. 1. Wrappers for New Laid Eggs.

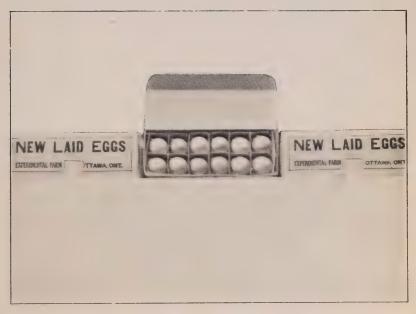


Fig. 2. Wrappers for Hatching Eggs.





Fig. 3. Seal for New Laid Egg Cartons.

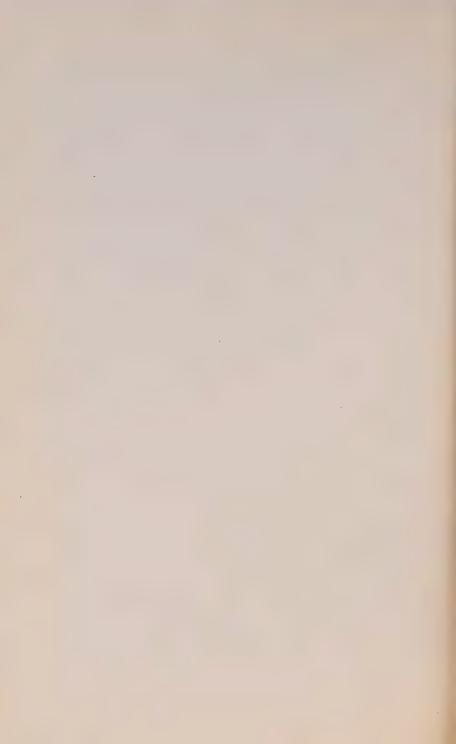


* Fig. 4. Cartons holding one dozen new laid eggs.





An illustration of a room brooder house in which a Candee coa burning stove is placed. This house is large enough to accommodate from five hundred to eight hundred chocks and a simple arrangement of yards such as shown makes a most convenient place for brooding chicks until they can have free range. The stove is very easily regulated and the amount of hieler retained such a read that the amount of A Room Brooder.





Experimental Breeding House.

An experimental house arranged so that visitors can see the birds either in the pens or the yards. The house is 12 feet deep and divided into pens six feet wide. The hens get into the individual yards by passing under the raised walk. There were larger virtus at the back towards the north, to which the pens of birds have access in turn. The windows are arranged so that frames of guess or cotton may be inserted and the partitions are made of removable cotton screens which, allows two or more pens to be thrown into one; the flooris census.



THE DEMAND FROM ABROAD.

The home conditions look as if greater production is not only warranted, but argently needed, and no account has been taken of the demand for poultry products, and especially eggs, that will come from abroad. Just now, when we are being asked to produce, to help feed the Empire, is surely a good time for Canada to get back into the exporting class. It may be that we shall not be able to export much this year, but we ought at least to lay the foundation for greater production that will permit of some export at least. Great Britain consumes about 12 million eggs every day; a little over a third of these are produced within her own border, but the rest of them, over 200,000,000 dozen a year, have to be imported from other countries; and if one will take just a look at the countries that have been supplying these eggs in the past, it will be seen that her source of supply this year and possibly for several years to come, will be partially cut off, if she does not get some new sources of supply.

During the year 1913, Russia was the biggest contributor, sending, in round figures, 114½ million dozen; then came Denmark with 42½ million, Egypt 11 million, the Netherlands 10 million, Austria-Hungary 9 million, Italy 8½ million, France 7 million, Germany 5 million, Sweden 3½ million, other countries, including Canada

and the United States, 41 million.

From this it will be seen that the bulk of Great Britain's egg supply has come from countries now actively engaged in war or affected thereby, so that, in all probability, many of these sources will be cut off entirely and a number more considerably curtailed.

With such a state of affairs, is it right that we in Canada, instead of helping to produce poultry and eggs to feed the Empire, should be really eating what others are producing, and are thereby a hindrance instead of a help in this time of national need?

HOW WE CAN INCREASE PRODUCTION.

Good Breeding Stock.—In the effort to increase production, one of the first points to lay stress upon is a warning not to breed from poor stock. A few breeders might think, because greater production is asked for, it would be advisable for them to set eggs from anything and everything, but probably no greater mistake could be made, for it is to be remembered that we are building for the future, and even more care than ever should be taken that the breeding stock should be as good as possible and especially should it have health and vigour. Do not use breeding stock that has ever been anaemic, or that lacks constitution. Eggs set from such birds never prove very fertile and the chicks cost more to raise than they are likely to bring when matured.

Keep the Cost of Production Down.—Care must be taken also that the cost of production is not too high, and the first step to lessen the cost is taken when we climinate everything from the breeding stock but that which has the very best constitution. Adopt system in the poultry work. Give it into the care of some one person, rather than allow any person (which very often means no person) to be responsible for the plant. It is a good thing for both the plant and the manager to allow one of the children even to take over the management. Let the boy or girl have an interest in the plant. Assist them to put it on a business basis, so that they can keep accurate accounts and know how much revenue is obtained from the plant each month and year.

System in feeding, system in marketing, along with clean sanitary conditions go a long way to cut down the expense of production.

16—70 Ottawa.

Early Pullets Necessary.—Every year eggs are scarce and consequently high in price during the late fall and early winter, and the only way to have eggs to sell at this time of the year is to get ready in plenty of time. Early spring is the time to prepare for eggs the following November. See that the pullets are hatched early because it is only the early pullet that will give the early egg. If possible, mate with the healthy hens in the spring, a good vigorous cockerel that comes from a laying strain. Feed the young chicks well throughout their growing period and have the pullets matured early and put into winter quarters before they are ready to lay, so that they can go right ahead without any interruption.

Market When Ready.—Though there is a good deal of waste in the system of production, there is even more in the methods of marketing. Study the egg market as well as the wheat market and sell eggs how and where they are worth the most. Of course, the only time to market eggs is when they are absolutely new laid, and the national loss that occurs from the marketing of eggs when they are not new laid, but in some cases when they are absolutely stale or even rotten, amounts yearly to an enormous sum, and because of this national waste, which the producer can largely overcome, he has to take a less price for his produce. Market eggs as direct to the consumer as is practicable and market in such a condition that the producer can guarantee the product, and so that he will not be ashamed to have his name appear on every package.

In the marketing of dressed poultry, the aim should be to distribute the produce over as many of the 12 months as possible. Our system in Canada, of throwing everything both old and young on to the market within a few months in the fall, has done more to bring down prices of poultry meat than anything else. If this year we would endeavour to market as many of the early cockerels as possible in the spring when they can be sold as broilers, it would lessen the glut which invariably takes place in the fall. Sell the old hers after the breeding season in thei than along with the chickens in the fall. The relative profits for spring marketed produce and for that marketed in the fall show a marked contrast. As an illustration take the prices for the young ducks which we marketed last year, an account of the sale of which was given in the 1913-14. Report, page 966. These green ducks were marketed when 103 weeks of age and brought at 20 cents a pound within a few cents of a dollar each. Similar ducks, however, when marketed in the fall or the usual time for selling them, brought the same price per head, but the difference in the cost of production meant the difference between a good margin of profit and a loss. The green ducks cost for the amount of feed seven cents per pound of gain, which meant that the selling price gave practically 200 per cent profit over the cost of food, whereas the selling price for the older ducks in the fall barely covered the cost of feed. The Toronto quotations for ducklings last spring were from 30 to 50 cents per pound live weight, while the quotations last fall for the matured ducks were 9 to 11 cents.

The same is true of the chickens; broilers were bringing 30 to 50 cents per pound live weight in the spring when roasters, or the same birds if sold in the fall, were bringing 10 to 13 cents, and as for hens, the fall prices quoted in Toronto were from 6 to 8 cents, whereas in the spring they were quoted at 14 to 20 cents.

This system of helding practically all poultry meat until fall is disastrous and must be remedied if the producer wants to get the most out of what he has to sell, and incidentally the early marketing materially cuts down the cost of production.

All producers are unable to avail themselves of these higher prices because of distance from market, cost of transportation and comparatively small quantities of produce to sell; nor can it be expected that they will be able to do so under present conditions, but there are others who might do so, and if they would it would help the general market a little at least while those not so favourably situated might co-operate and through co-operation have sufficient to make it worth while to ship.

In this connection, however, it should be considered almost criminal to sell poultry for eating purposes unless it is finished. Thin poultry is given by the dealers as one of the reasons why prices were so low last fall and the conditions were even worse than usual because of the high price of feed. It costs less to put on the last few ounces or pounds, or what might be called the finishing touches, than it does to put on a similar weight at any other time in the growth of the bird. This increases the price of the bird materially, so that the producer gains in both ways, i.e., lessens the cost of production and increases the price of the article.

Village and Town Poultry.—There seems no reason why the keeping of poultry should not be more popular in the towns and villages, and even in some sections of the cities. The objection frequently advanced can be traced to two sources,—the insanitary conditions in which a few poultrymen keep their poultry plant, and the presence of nervous or over-sensitive neighbours.

First take the latter reason: It is astonishing how many people can keep a dog and pay little attention to its continual barking. How seldom they hear the tooting of the automobile or the racket which the early city deliveries make, or even the shrill whistle of the steam engine. Any, or all of these may make noise enough to waken the whole town, and very little complaint is ever heard, but let a well-meaning rooster attempt a morning crow, no matter how musical it may be, and the police department is notified at once. Surely at this time, when so much is being said about the high cost of living, ordinary common sense might be used in cases of this kind.

On the other hand, there is no reason why poultry plants in the limits of the town or city should become a nuisance if ordinary sanitary precautions are taken. It might be a good plan if all towns or cities would appoint a capable inspector who would see that all poultry plants were kept in a sanitary condition. There are many city femilies that could not only provide themselves with new laid eggs and table poultry, but by keeping a small flock of laying hens could make use of feed that goes into the garbage can, and might in some instances almost keep the family table provided with greeceries.

It is the summer conditions of the city poultry plant to which most objections are raised and to overcome this, many city and town families follow the practice of buying on the market or elsewhere well matured pullets in October and November, feeding them heavily for eggs throughout the winter and selling or eating the birds in the cornar. This method is to be recommended as it provides eggs when eggs are high in price, turns table scraps into new laid eggs and leaves the back yard for the summer garden with a quantity of good fertilizer for growing vegetables, etc. In most cases the birds can be sold in the spring for what will replace them with pullets in the fall. See experiment in this report, page 1111.

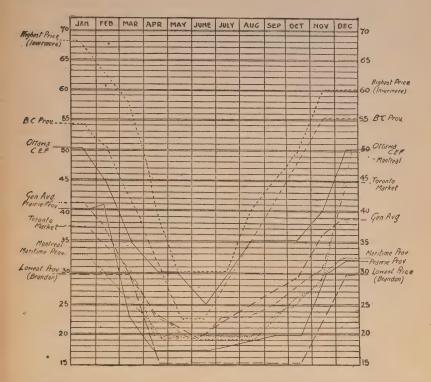
PRICES RECEIVED FOR EGGS AT THE VARIOUS FARMS OF THE EXPERIMENTAL FARMS SYSTEM.

The prices given in the table below, though they are not always the actual local prices, will indicate the relative value of new laid eggs for the various months of the year at the several Farms that sold eggs throughout the year 1914.

All eggs marketed from this system are selected, wrapped in printed tissue paper and packed in one dozen egg cartons, sealed and, if to be shipped, enclosed in corrugated carriers that hold six or twelve one-dozen egg cartons.

Farms.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Avg. per Farm.
Agassiz, B.C. Invermere, B.C. Lacombe, Alta. Indian Head, Sask Brandon, Man Fredericton, N.B. Nappan, N.S. Kentville, N.S. Charlottetown, P.E.I	40 63 40 50 30 40 31 30 32	40 62 35 50 30 35 31 28 30	25 58 18 20 30 35 27 20 25	25 40 17½ 20 15 25 25 14 19	25 30 17½ 20 15 25 25 18 20	25 30 17½ 20 15 25 25 18 20	27½ 30 20 20 15 25 25 18 20	35 40 22½ 20 15 25 25 18 22	40 45 25 20 15 25 25 25 22 23	45 50 25 20 15 28 25 25 25 25 25	50 60 30 30 35 30 25 30	50 60 35 30 30 35 30 35 30 35 30	35½ 48 25 27 21 30 25 22 25
Average per month. Average for B.C. Average Prairie Provinces. Average Maritime Provinces. C.E.F., Ottawa. Average for all Farms	40 54 40 33 50 41	38 51 41 31 45 38½	29 41½ 23 27 35 29	22 32½ 17 21 30 23	$\begin{array}{c} 22 \\ 22\frac{1}{2} \\ 17 \\ 22 \\ 30 \\ 20\frac{1}{2} \end{array}$	22 22½ 17 22 25 20	22 29 18 22 30 23	25 37½ 19 22⅓ 35 21½	20 ⁻ 24 35	28 47½ 20 25 35 29	35½ 55 30 30 40 36	37½ 55 32 32½ 50 39	29 41 25 25 ¹ / ₂ 36 29 ¹ / ₂
Toronto prices	37 34	33 32	30 30	20 19	21 20	19 19½	23 19	23 19	25 22	28 26½	31 27	4 5 50	28 26½

Chart No. 1.—The range of prices given by provinces or sections, of new laid eggs at Experimental Farms, also the average resources paid for eggs at Toronto and Montreal.



Note.—Of individual farms, Invermere, B.C., has the highest average price for the year and British Columbia has the highest provincial average. Brandon has the lowest average. The lowest range of the highest average price is the same as the highest range of the lowest average price—30 cents. The highest price occurs in January and the lowest in June.

EGG WRAPPERS AND SEALS.

The use of wrappers for fresh eggs adds considerably to the appearance of the package when opened and also to the safety in shipping of both new laid eggs and eggs for hatching. Illustrations of the wrappers used at the Experimental Farms are given herewith. These wrappers are made of light tissue paper such as is used on oranges and are in size 8 inches by 8 inches.

The seals, of which an illustration is also given, are for the purpose of locking or sealing the carton so that the contents cannot be interfered with until opened for consumption.

IS THE SHIPPING OF HATCHING EGGS HARMFUL?

Last spring, breeding eggs were shipped to a number of the branch Farms and in several cases the fertility of the eggs after being tested at the branch Farms was considerably lower than the fertility found in similar eggs set at the home farm.

It would be well, however, to note that in the case of the shipped eggs they would be from two to five days older than those set at Ottawa, though this should not make the difference shown in the table below.

FERTILITY AND HATCHABILITY of Eggs at Central Experimental Farm compared with results obtained at Branch Farms with eggs from same pens at approximate date of shipping.

Date Shipped from Ottawa.	Similar eggs	Station Shipped to.	RES	ULT HIPPING. ·	Results at Ottawa.		
	Ottawa.	Station Shipped to.	Per cent fertile.	Per cent fertile hatched.	Per cent fertile.	Per cent fertile hatched.	
April 20 May 19	May 19	Lethbridge, Alta Brandon, Man	51·8 95·5	7:4 44:0	84·4 73·6 81.1	51.3 28.4 79.5	
May 27	11 27	Nappan, N.S	96.5	00.0	73·6 81·1	28·4 79·5	
July -2	July 2	Lacombe, Alta	25·9 28·6	28·5 37·5	92.5	74·3 74·3	
General Average.			60.2	23.5	82 7	59.4	

Note.—As far as possible the eggs were similar.

In two cases the fertility at destination was higher than at Ottawa, though the general average gives a decrease of twenty per cent in fertility and twenty-three per cent in hatchability in the shipped eggs.

The non-hatch at Nappan, N.S., must have been partially due to local causes.

It looks as though the less handling and travelling hatching eggs receive the better.

MARKETING LATE PULLETS IN FALL VERSUS HOLDING UNTIL SPRING.

At the beginning of last winter, having on hand a lot of thrifty late hatched pullets, the result of incubation experiments, it was decided to carry some over the winter to see if it would pay better than to market them at the time. There were seventy White Leghorns that had been hatched about the middle of July and had been pushed as rapidly as possible, the cockerels having been marketed as soon as ready.

These seventy pullets were divided into two sections; twenty of the best were placed in a back yard to be run as a city flock, the other fifty were put into a small pen of a glass and cotton front house,

On January 1, twenty of these pullets, averaging two and a half pounds each, were placed in their back yard poultry house where they were fed largely on table scraps. For the months of January, February, March and April, the only food purchased was 150 pounds cracked corn \$2.70, 100 pounds shorts \$1.40, one bag of potatoes 75 cents, a total for feed of \$4.85. During that time these pullets produced a total of \$957 eggs as follows: 92 in January, which sold at fifty cents, the price at which eggs were sold here, \$3.83; 192 in February at forty cents, \$6.40; 308 in March at thirty-five cents, \$8.98; 365 in April at thirty cents, \$9.12, a total revenue of \$28.33, or in

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other words these twenty pullets turned \$4.85 worth of feed, plus table scraps, that would otherwise have been wasted, into \$28.33 worth of eggs, a gain over cost of feed of \$23.48.

At the same time fifty others averaging two and one-quarter pounds were placed in two ten by ten pens and a record kept of all the feed consumed and the eggs produced during the same period. During the first part of the period they were fed grain consisting of equal parts cracked corn and wheat in the litter morning and evening, with crushed oats in hoppers constantly before them. Later the grain was changed to equal parts corn, wheat and oats, and a dry mash consisting of two parts wheat bran, two parts middlings, two parts cornmeal, one part gluten feed, and one part meat scrap, was used instead of the crushed oats. The pullets also had oyster shell, grit and charcoal constantly before them, and milk, green bone and roots were regularly supplied.

During the four mouths, January, February, March and April, they consumed 781 pounds grain, 205 pounds mash, 105 pounds crushed oats which at two cents per pound amounted to \$21.82; 15 pounds charcoal, 10 pounds grit, 35 pounds shell at one cent per pound, 60 cents; 72 pounds green bone at three cents per pound, \$2.16; 1,200 pounds of milk at twenty-five cents per 100, \$3; 360 pounds roots at \$5 per ton, .90; or a total of \$28.48 for feed for the four months. During the same period they laid 100 eggs in January which were sold at fifty cents, \$4.16, 248 in February at forty cents, \$8.26, 641 in March at thirty-five cents, \$18.69 and 772 in April at thirty cents, \$19.30; a total of \$50.41, or in other words a profit over cost of feed of \$21.93.

It will be noticed that these birds were kept in fairly crowded quarters and the prices allowed for feed were in every instance high, higher than most poultry keepers would have to pay, also the amount of green bone, milk and roots were estimated and in every instance the estimate was always placed high. The eggs were rather small but were not too small to be readily saleable; they weighed twenty-three ounces to the dozen. There were six birds lost during this period, but the remaining forty-four weighed seven pounds more at the beginning of May than the fifty did at the beginning of January. It should also be noted that the pullets were just coming into full laying at the end of the period, and the next four months would see a greatly increased production, so that whether the pullets were marketed at the end of the test, at twenty cents per pound, which was the price that could have been obtained, or whether, as would be the most profitable course, they were kept over for several months and then marketed, the advantage of keeping till spring in either case would be substantial. The following statement of the two lots shows clearly the profit made on each lot.

EXPENDITURE AND RETURNS of twenty late-hatched pullets for four months, kept under city conditions.

DR.			
150 pounds corn	\$ 6	00	
1 bag potatoes	4	85	\$10 85
CR.			
92 eggs, Jan. at 50 cents per dozen. \$ 3 83 192 "Feb. at 40 cents per dozen. 6 40 208 "Mar, at 35 cents per dozen. 8 98 365 "Apr. at 30 cents per dozen. 9 12 19 hens, 3 pounds, 57 pounds at 20 cents.	\$28 11		\$39 75
Net profit over cost of feed			\$28 88 OTTAWA.

Expenditure and Returns of fifty late-hatched pullets for four months where all food was purchased.

Dr.		
To 50 pullets, 112 pounds at 12 cents	\$13 44	
781 pounds grain, 205 mash, 105 crushed oats at 2 cents per pound \$21.82		
15 pounds charcoal, 10 pounds grit, 35		
pounds shell, at 1 cent per pound 60		
72 pounds green bone at 3 cents per pound 2 16		
1,200 milk at 25 cents per 100 3 00		
360 pounds roots at \$5 per ton 90		
· · · · · · · · · · · · · · · · · · ·	28 48	0.14 0.0
		\$41 92
CR.		
By 100 eggs in Jan. at 50 cents per dozen \$ 4 16		
248 " Feb. at 40 cents per dozen 8 26		
641 " Mar. at 35 cents per dozen 18 69		
772 " Apr. at 30 cents per dozen 19 30		
	\$50 41	
44 hens, 120½ pounds at 20 cents per pound.:	24 10	
	7	\$74 51
Net profit over cost of feed		\$32 59

Notes.—In both cases it paid to keep the pullets over till spring and as noted above, the laying was reaching a high record at the close of the contest period.

It is also well to note that table scraps for four months from a family of three were worth in new laid eggs \$6.59, being the difference in the cost of feed required for twenty birds in the two cases.

These late pullets would never grow to a good size nor would it be wise to use them for breeding.

Part of the extra revenue obtained by keeping the birds until spring is obtained from the higher price for meat available at that time.

WHEY AS A SUBSTITUTE FOR SKIM-MILK IN CRATE FEEDING.

Because of so many inquiries reaching us in reference to the possibility of using whey instead of skim-milk in mixing the mash for crate-feeding poultry, a small experiment was conducted in December, 1914, the results of which are given here.

Method of Feeding.—Thirty-six birds used in the experiment were assorted as nearly as possible as to size, vigour and breed.

They were starved for 24 hours before the experiment commenced and given water with a mild dose of Epsom salts.

They were fed sparingly the first day and the quantity of feed was gradually increased at each meal till they were on full feed at the end of the third day.

The feed was mixed thin enough to pour slowly into troughs and two feeds were given daily as far apart as possible allowing for daylight. Windows were darkened except when the birds were eating.

Grit was supplied once a week and a little green food every other day at mid-day.

All birds were weighed at the end of the starvation period and weekly during the experiment.

At the end of the experiment the birds were starved 36 hours and weighed before killing.

They were again weighed dressed (with head and feet), and also when drawn, ready for the oven.

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Weekly gains, feed consumed, pounds of grain and cost of one pound gain on skimmilk and whey.

-												
Number.	Whey or skim-milk.	t of 12 birds art of experi-	ain in	at end of weeks.	Feed consumed in three weeks.			Total feed consumed.	or milk con-	ls of feed for pound of grain.	of milk or for one	cost of one
Crate 1		Weight at star	Toral ga weeks	Weight	1st	2nd	3rd	Total fe	Whey or sumed	Pounds one po	Pounds whey pound	Total cost pound of
*1 2 3	Skim-milk Whey Whey and beef scrap	Lb. 49.0 57.5 59.5		Lb. 76.5 71.0 70.0	31	Lb. 25.0 20.5 21.5	Lb. 21 16 21	Lb. 80.0 67.5 72.5	Lb. 124.0 102.0 109.0	Lb. 2·9 5·0 6·9	Lb. 4.4 7.4 10.0	Cents. 6.8 12 16

*11 birds only; one died seventh day, weight 3½ pounds.

NOTE.—Feed cost 2 cents per pound. Skim-milk and whey reckoned at 25 cents per 100 pounds.

EDIBLE AND NON-EDIBLE PARTS.

The relative weights of giblets, head and feet, feathers and offul compared with the dressed weight of the carcass, and the figures given are the average for each crate of twelve birds, as shown above.

Average Weight Dressed and Drawn.

Crate.	Dressed carcass.	Giblets.	Head and feet.	Feathers.	Offal.
•	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
No. 1	66·3 67·4 66·9	7·6 7·6 7·5	15·1 13·0 12·8	4·0 5·4 . 5·8	7:0 6:5 7:0

Note.—No. 1 moulted considerably and at plucking were heavily pin feathered. The ration would probably have something to do with this as both the whey, and whey and beef scrap crates feathered about the same.

CAPONS VERSUS COCKERELS FOR PROFIT.

The marketing of capons has been receiving considerable attention for some time. though there seems to be a difference of opinion as to whether on an ordinary market it pays better to caponize or market as cockerels.

To get some data upon this subject 12 cockerels and 24 capons were selected in November, 1914, when the 12 cockerels and 12 of the capons were put into crates and milk fed for three weeks. The other 12 capons were fed in a pen until spring. In March they were put into a crate and fed in a similar manner to those fed in December.

The purpose of the experiment was first: To ascertain the relative advantage of feeding and marketing cockerels and capons at the time cockerels are usually sold and when farmers would find it almost necessary to get rid of the birds whether

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cockerels or capons because of lack of room. Second: To find the relative profits in marketing capons in the fall at 5 or 6 months of age or in the spring at 9 or 10 months.

Up to the time the 12 cockerels and 12 capons were put into the crates the cost had been practically the same. The capons were a little older than the cockerels and as will be noticed by the table, weighed more. The cockerels had had large yards to run in; the capons had been yarded in smaller pens.

FEED CONSUMED, TOTAL COST OF FOOD; COST OF ONE POUND OF GAIN AND NET GAIN OF COCKERELS AND CAPONS.

Birds.	Weight at start.	Total gain.	Weight 3 weeks.	Feed consumed.	Milk consumed.	Pounds of mash for 1 lb. gain.	Pounds milk 1 lb.	Total cost 1 lb.	Total cost.		Market value less cost.of cratefeed-ing.
	Lb.	Lb.	Lb.	Lb.`	Lb.	Lb.	Lb.	cts.	cts.	\$ cts.	\$ cts
Cockerels	49 58	27·5 18·0	76·5 76·0		124 118	2·6 4·1	4·2 6·3			15 30 19 00	
Spring capons	76	8.0	84.0	87	125	11.0	1 5 · 5	25.0		29 40	19 42

^{*} Cost of feeding from fall to spring.

Notes.—The fall cockerels sold for 20 cents per pound and the fall capons for 25 cents, while the capons in the spring brought 35 cents per pound; but the capons sold in the spring had cost \$7.98 for feed to carry them over the winter.

The capons grew in weight better than the cockerels before going into the crates, but did not do as well during the three weeks crate feeding and the cost in the crates was more per pound.

The higher sum received for the fall capons was just equivalent to what the five cents higher price amounted to.

In this case the capons paid better because the flesh was worth five cents per pound more.

The advisability of keeping capons until spring again depends upon the greater price received for them.

INCREASE OF FERTILITY AFTER INTRODUCTION OF THE MALE.

In last year's report, page 962, table 5, the daily increase in fertility after the introduction of the male was shown, and for the sake of comparison with table No. 9, showing the decrease of fertility after the removal of the male, the table is again given here.

SE	SSI	IONAL	PAPER No	. 16
			18. 2nd 3rd 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 15th, 16th, 17th, 18th, 19th, 20th, 21th, 19th, 20th, 21th, 18th, 19th, 20th, 21th,	
			21st. 75 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	9.28
			20th. 66°6 84°6	Nii Nii 11 116 2 95 0 54 1 51 1 4 57 5 51 7 60 8 77 7 65 79 5 52 1 52 5 80 0 63 0 69 9 68 7 75 6 87 5
			19th. 50·0 87·5	2.89
			18th. 60·0 78·5	6.69
	1		17th. 50°0 76°1	80.0 63.0
	,	Per cent Fertility, First to Twenty-first day.	16th. 60·0 100·0	0.08
ć.		ty-fire	15th. 30°6 75°0	52.5
Ma]	1	Twen	14th. 41°6 72°7	79.5 52.1
Daily Increase in Fertility after Introduction of Male.		rst to	13th. 68-2 90-9	79.5
lucti		ity, Fi	12th. 61.5 91.6	2.92
ntro		Fertill	11th. 100 0 55.5	1.22
fter]		cent	10th. 37·4 83·3	57 5 51 7 60 3
ty a		Per	9th.	5 51 -7
rtili			8 10 Sth	15
Fe			15 5.5 26	12
SE in			6th. ST	54.1
CREA			5th.	95.0
Z IN		`	4th.	16.5
)AIL			3rd.	
I			E 22	7
	-		1 72	/ E
	1	Date mated.	Mar. 18 Nil. Nil. N. N. 200 (12.5) State (10.0)	
		Breed.	Barred Plymouth Rocks.	Average
	1,	Pen.	12 23	

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DECREASE OF FERTILITY AFTER REMOVAL OF MALE.

The increase of fertility upon the introduction of the male has been noted, and it is also important to know how long it takes after the removal of the male for fertility to cease. It is well to know this, especially if the eggs at the close of the hatching season are to be used for consumption or preserved for winter use.

The following table and chart are of interest as they show that the germ exists in

fertilized eggs for a far longer period than is generally supposed to be the case.

To carry out this investigation two pens were utilized.

Pen 16 contained 49 Barred Plymouth Rock pullets, pen 17, 39 two and three year old Leghorn hens.

The fertility of both pens had been very satisfactory all through the hatching season, the males being strong vigorous birds of one year and two years respectively.

The eggs from both pens were taken from the nests daily, marked as to date, and

placed in a Candee Incubator.

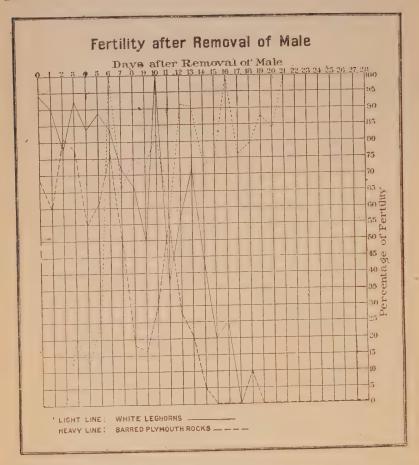
The experiment was prolonged nine days after the germ had apparently ceased to exist so that it could reasonably be accepted that such was the case.

SESSIONAL PAPER No. 16

0 00 10.00 18 90.0 0.00 0.00.0 15 98.24 14 DECLINE in Fertility day by day after the removal of the Male from Pen. 43 13 71. 1482 12 51. 56.50 1 37. 50.00 100.00 φ. 18 00 .99 43 71. 67.33 တ 383 89 5.58 33 83. 23 3 .26 27 00.09 28 94. White Leghorns.

Barred Plymouth Rocks Days Removed.

It will be seen from the following chart that the decline was somewhat erratic in both pens and not steadily weaker as might have been supposed but on the tenth day after the removal of the male the Leghorn pen showed the remarkable fertility of 100 per cent though 66·6 of these fertile eggs were "blood rings" and only 33·3 strong germs.



Note.—The fine dotted line starting at 0 on the 2nd day and ending at 100 on 21st day denotes the increase in fertility in a pen of Barred Plymouth Rock pullets after the introduction of the male. There was no fertility after the eighteenth day, though the eggs until the twenty-sixth day were set and tested.

This experiment goes to show that there are traces of fertility even to the cighteenth day, and eggs intended for storing should not be taken until the male bird has been removed for at least two weeks.

The fertility was traceable to the eighteenth day, but in such small proportion as to be of little detriment.

ADMINISTRATION BUILDING AT BRANCH FARMS.

An administration building for the poultry work has been built at several of the branch Farms and Stations, photograph and plan of which is given here. The arrangement of the various rooms is convenient and allows for an incubator room large enough for seven bundred or eight hundred egg space in small machines, or twelve hundred eggs in a mammoth machine, an egg room which is also used for testing, and a coal room in the basement. The ground floor provides for an office and record room and a room for mixing feed; into this room come spouts from the grain bins above. The attic contains a bed room and a store room for grain. Feed is elevated into this room by means of a rope and pulley which delivers the bags through the gable door.

This arrangement has proven quite satisfactory at the branch Farms and is recommended for small and medium sized plants requiring similar accommodation.

A NEW DISEASE IN DUCKLINGS.

During the summer of 1914 there were numerous complaints and inquiries received at this Division, also published in the poultry press, about a disease that had made its appearance in ducklings. These complaints were not confined to any one locality but came from widely separated districts. One newly established commercial plant that expected to go into duck raising extensively lost ducklings in large numbers that they procured for foundation stock. These were purchased in the United States from some of the largest and most successful duck growers, some as day-old ducklings and some at from three to six weeks old. The age at which they were shipped did not seem to make any difference, as apparently they were affected in the same manner.

After visiting the above mentioned plant, which may be referred to as "A," and noting the condition of the sick ducklings, a few were brought to this Division for observation. It was then decided to get 100 day-old ducklings from "B", a large American breeder, to study the disease. Later a shipment of 46 ducks weighing 90 pounds, half of a lot which "A" had received from "C" (the American breeder who had supplied most of their stock), were also received. "B" shipped to this Division one hundred and three ducklings; two were dead on arrival on a Friday evening, the others appeared to be in good condition. On Monday morning when they were fel they appeared to be in normal condition except for two or three that looked a little sleepy; half an hour after feeding 18 were stretched out dead. Out of the 101 ducks received 44 were raised. From 46 received from "A" 37 were raised. The other half of the shipment which "A" retained were practically all lost.

A few of the ducklings which were hatched from eggs from Experimental Farm stock were also affected but they were isolated cases and did not die in groups as the imported ducklings died.

The trouble was not confined entirely to the ducklings, as growing ducks about six weeks of age were sometimes affected, though in the more mature ducks the symptoms were more pronounced and were often noticeable for some time before death. There was a discharge from the eyes and sometimes from the nostrils, and there appeared to be an affection of the brain as the head would be thrown back until it touched the shoulders, the duckling often staggering backwards until it would fall over. In one case a duckling kept up a continual thrashing with its head for over two days until it finally became exhausted and died. In another case the head was thrown back and downwards, then brought forward and upwards, until the neck formed a complete loop. In some cases the ducklings seemed to recover although it was noticeable that under excitement some of the symptoms were liable to recur, and at the "A" plant some of the ducklings would be taken with these spasms while swimming and the result was that they would drown.

With a view to determine the reason for the losses the matter was taken up with Dr. Higgins of the Biological Laboratory who detailed Dr. Wickware to study the problem presented. Dr. Wickware saw the affection at the "A" plant and at the plant of this Division. His examination revealed a parasite in the blood of all seriously affected cases. This parasite gradually disappeared as recovery took place and it is assumed to have some connection with the appearance of the affection in question. Further studies are necessary before this point can be fully determined. It may be advisable to point out that the staff of the Biological Laboratory consider it absolutely necessary to have the sanitary conditions under which ducks are maintained at the very highest standard obtainable.

They also consider that the breeding stock should be virile and that the methods of raising should preclude the possibility of infection gaining entrance from outside sources, or of limiting it should such an infection unfortunately gain access to any portion of the plant. They make this suggestion pointing out the fact that many wild birds are known to harbour blood parasites without presenting evidence of disease and that the same birds, if placed under artificial conditions, may readily succumb to such parasitic infections which under normal conditions would cause little or no

appreciable inconvenience to the birds in question.

We present this explanation in order that the reader of this report may in some measure understand the difficulties encountered in dealing with losses from unaccountable causes. Where losses are experienced, material should be forwarded with as little delay as possible to the Biological Laboratory for examination and there should accompany it a full detailed report concerning the difficulties. It is only by the reporting of such losses that knowledge can be secured which will lead to their future prevention and elimination.

At first it was suspected that the shipping of the ducklings was largely responsible for the trouble especially as both "B" and "C" claimed that they had no trouble whatever. However, a visit to plant "C" revealed the fact that there had been trouble and a great deal of it, for it was learned there that as many as 600 ducklings would die in a single day. It was also stated by men on this plant that the trouble had been so bad at plant "B" that incubation had to be stopped entirely on account of it.

At the Canadian plant "A," a flock of about 400 breeding ducks was kept over for 1915 season's breeding but on the disease again appearing in the early hatches

this spring the proprietor marketed practically the entire flock.

In Canada the production of green ducks is just in its infancy and unless something is done immediately to combat this apparently new but dread disease, as far as Canada is concerned the industry will receive such a setback as will take it years to recover from.

SHORT ACCOUNT OF TRIP MADE TO THE COUNTY OF CHICOUTIMI AND SAGUENAY, QUE., FROM JULY 1 TO AUGUST 5, 1914.

By VICTOR FORTIER, Assistant.

During the first half of July, together with Mr. Joseph Girard, M.P., I visited the principal parishes of the eastern part of the County above mentioned on the north shore of the Gulf of St. Lawrence from Portneuf to Natashquan, 400 miles below Tadousac. It was the first time that the inhabitants of this part of the province of Quebec had been visited by an employee of the Federal Department with a view to speaking to them on agricultural matters. The meetings were well attended, the average number of people present being about 150. They all appeared well pleased



16-1916-70a.





Fig. 17. First cotton front poultry house erected in the Lower St. Lawrence, below the Saguenay River, the property of Mr. Xavier Maltais, Dalbeau, P.Q. This gives satisfaction, even in this extremely cold district.



Fig. 18. Poultry House belonging to Mr. S. Larouche, Taillon, County of Lake St. John. If the cotton had been brought nearer the roof, there would have been a better circulation of air in the top part of the house.

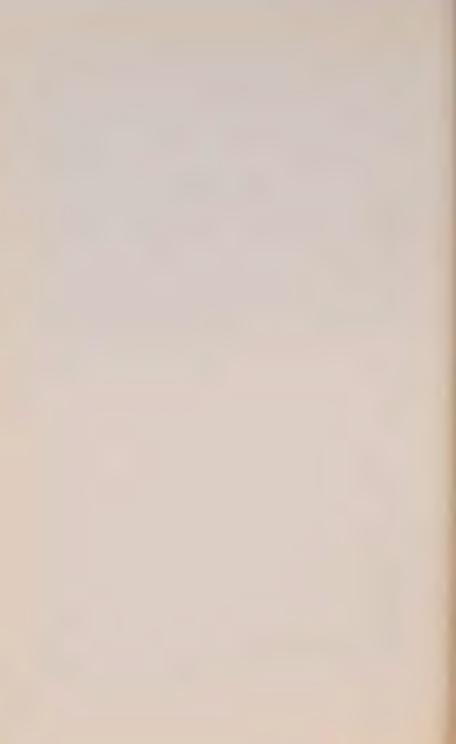




Fig. 15. Poultry house which does not give satisfaction, at Esquimault Point, 500 miles below Quebec. Though double-boarded and tight, there is nothing in this building to counteract the deleterious effects of lack of light and ventilation.



Poultry house which gives satisfaction at Esquimault Point, 500 miles below Quebec. The lack of light in main building is made up by the larger windows and large space for cotton on front of scratching shed.





Fig. 16. Poultry house at Natasquan, 620 miles below Quebec. This is damp and ill-lighted, though costing three times more than a modern shed, roof cotton-front house.



Main Street, Seven Islands, 300 miles below Quebec. Note absence of vegetation of any kind.



with the information given them on poultry raising and on agriculture in general. The latter subject was dealt with by Mr. Girard, whose experience and knowledge in general farming were greatly appreciated.

Scientific poultry raising and also the modern methods of farming are very little known in this part of the country. The methods followed are primitive and much educational work is needed. Although eggs and poultry are, with fish, the main food used by numerous families on the north shore of the Gulf of St. Lawrence, the quality of the poultry throughout this section is very poor. The early hatching of chickens is very little understood and winter egg production is practically nil, although that is the very time during which eggs would be most acceptable to these people who then find themselves almost completely isolated and deprived of all communication and means of transport by boat or by railway.

Entering the Bay of Seven Islands a magnificent view is presented. On the left one sees a large whale fishery, on the north the wharves of Clark City, where large vessels can be accommodated, on the right the village of Seven Islands situated on a large sand hill. The bay itself is about five square miles in area and furnishes an excellent natural port which could shelter a large flect. The village of Seven Islands is made up entirely of French Canadians, whom I found hospitable, intelligent and obliging. There are about 300 houses in the village. A third of them are occupied by Indians of the Montagnais tribe. These are gentle, timid and at first distrustful, but as soon as one becomes acquainted with them the children follow one all over the village and the parents themselves seemed to regret our departure.

Not a single tree was to be seen in the street. However the view over the bay, which is remarkable in its nature, was superb. At Seven Islands is the residence of Monseigneur Blanche. There is also a very pretty church and a fine one. A doctor is located there and there are several general stores. Fishing and hunting are excellent in this locality.

A regular weekly service of boats is maintained with Quebec.

In going to Pointe-aux-Esquimaux, we passed the island of Anticosti, where we had occasion to visit the splendid and immense Meunier establishments, most of which stand on Ellice Bay. The woodpulp industry seems to be in a flourishing condition. Stores, warchouses, bakeries, post office, fire hall, etc., are all well constructed, and are kept in good condition. The settlement comprises about thirty families.

Baie Sainte Claire.—A little village of about sixty families, situated nine miles north of Ellice Bay, has excellent roads. There are many wild animals of all kinds in the vicinity.

Our call at Baie Ste. Claire was much appreciated by the inhabitants of the island. Mr. Jeseph Girard, M.P., in the name of the Government, presented to Mr. Albert Maleuin, lighthouse keeper of the west point, and Deputy Governor of the island, an Imperial Service medal for long and faithful service (41 years).

Pointe aux Esquimaux.—This village consists of a hundred and eighty-five families, mainly French Acadians. No farm work is carried on here. Potatoes grow fairly well, and the people keep a few fowls. Besides these, the principal industry is the cod and salmon fishery.

Natashquan.—This village contains forty-five fishermen's families. The soil is sterile, and poultry are the only living things the inhabitants are able to rear.

Mingan.—This settlement has a population of sixty Indian families, and only three French Canadian families. There is hardly any poultry raising, and no agriculture. We had a meeting there at which 125 people were present. The speeches were interpreted by the Roman Catholic missionary of the place.

Riviere Saint Jean.—Sixty French families. In winter the fishermen go to the timber yards. The young people might occupy themselves advantageously with poultry raising. Little agriculture is carried on here, but the soil is fairly fertile, and about twenty good milch cows are kept, but there are no dairies.

Oats ripen well, and potatoes produce ten to fifteen fold. The people descrve encouragement, and they need practical advice in agriculture and aviculture, for they have little knowledge of how to care for animals and poultry in winter.

Riviere au Tonnerre.—A village of forty-five families grouped round a little bay, whose deep waters offer a splendid harborage for small ships. We were surprised to learn that oats, barley, hay, tobacco, potatoes, vegetables, etc., thrive better than elsewhere. The soil is sandy. Nearly every family possessed some domestic animals, and

there were about eighty head of cattle in the parish.

From July 16 to August 5, Mr. A. Gingras, of St. Cesaire, Que., accompanied me, and we visited together the district west of Chicoutimi and Saguenay, from Portneuf to Mistassini. In the principal centres of this county we held two meetings each day, one at ten o'clock in the morning and the other at about eight o'clock at night. Generally, the audiences were good, averaging 125 people, with a minimum attendance of 40, and a maximum of 225. At the latter end of the trip, work in the fields prevented a great number of farmers from attending the morning meetings. In harvesttime, it is not practicable to hold agricultural meetings in the day-time, but those held in the evenings are well attended, in spite of the fatigue resulting from field work. In the course of our journey, we saw excellent harvests of hay, grain, and vegetables in some localities, while in neighbouring districts, where the soil appeared equally good, the crops were poor. There, as in many other parts of the country, we discovered in the case of some farmers, a little negligence, indifference, lack of knowledge, and much routine work, some not paying sufficient attention to the drainage of their farms, others to their system of farming, their selection of animals, the care of their agricultural implements, their choice of seeds, etc.

Aviculture, in the last few years, has made appreciable progress, this progress being attributable principally to the meetings that have been held in the country, and to the excellent results obtained at the poultry station which was formerly at Chicoutimi. At the present time, several farmers obtain a considerable revenue from poultry raising. Among them might be mentioned Mr. M. A. Gobeil of Chicoutimi, Adelard Fortin of Chambord, George Laberge of St. Prime, Madame Joseph Girard of Mis-

tassini, S. Laroche-of Taillon, etc.

We were told several times that ensilage corn could not mature in the vicinity of Lac St. Jean, and we were therefore surprised to see, on the farm of Mr. Edgar Barchard, of St. Jeanne, (Lac St. Jean) a fine field of this corn. This gentleman told us that for several years he has successfully cultivated ensilage corn, which has been of great use to him in the wintering of his live stock. This year, Mr. Bouchard has decided to construct a good silo, whose fine proportions and good arrangement we were able to see.

In conformity with instructions received, photographs were taken in the different centres visited. They are attached to this short report, and will give a fairly good

idea of the places and people that live there.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

POULTRY.

During the year a substantial poultry fence was erected around the poultry yards which were laid off just south of the sheep pens on the knoll facing the Prince Edward Island railway. The land was tile-drained and the houses arranged conveniently so that material could be hauled to or from them and visitors could get to them in groups during excursions. Two experimental colony houses were added to the equipment and necessary rearing houses and coops were made.

BREEDING STOCK.

The breeding stock in the spring of 1914 consisted of one pen of White Leghorns with one male and nineteen females, one pen of Barred Plymouth Rocks with one male and fourteen females and two pens of Barred Plymouth Rocks with one male and sixteen females each.

The season of 1914 seemed to be unfavourable for incubation. Many poultrymen reported a very large percentage of chicks dead in the shell. The percentage of chicks dying in the shell was quite high for all eggs set early in April in the incubators. As soon as the weather improved so that the breeding stock could run outside more there was a marked decrease. The percentage of chicks dying in the shell under the hens was only about 12 per cent for the season and was much less than under artificial incubation. Five hundred and sixty-three chickens were hatched during the season. Of these 524 were put in the brooder or given to hens and 340 chickens were raised to maturity.

METHOD OF FEEDING CHICKS.

When the chicks were hatched they were given warmth and rest, not being fed for the first few days. After being placed in the brooder house the chicks were given a little coarse sand and left until they were two to three days old and appeared hungry. They were then given bread crumbs moistened in milk. Any food left by the chicks was removed. They were then fed about every two and one-half hours during the day until they were about a fortnight old, as follows:—.

First feed.—Dry bread crumbs slightly moistened with milk.

Second feed .- Finely cracked mixed grain or commercial chick feed.

Third feed.—Rolled oats.

Fourth feed .- Dry bread crumbs moistened with milk.

Fifth feed.—Finely cracked mixed grains.

In addition they were given a little green grass and sprouted oats.

Water and grit were always available.

After the first fortnight the chicks were given coarser foods. Infertile eggs were boiled hard and mixed with the mashed food. Rolled oats and dry mash was placed where the chickens could get it at any time. The bread was discontinued; sweet milk was fed.

As soon as the weather was fit, the chicks were given runs outside with a hen to look after them or a brooder was placed in a rearing house and protection given them from cats and crows.

CRATE FATTENING versus COOP FATTENING.

An experiment was started on December 5, with 48 Barred Plymouth Rock cockerels to see if cockerels could be fattened as well in rearing coops as in specially prepared crates. Twenty-four birds weighing 122\(\frac{3}{4}\) pounds were placed in two crates and twenty-four other birds weighing 122\(\frac{3}{4}\) pounds put in two rearing coops. Each crate had three divisions so that there were four birds in each division. The coops were not divided; twelve birds being placed in each. They were given a fattening mash made up as follows: Two parts buckwheat, one part oats, one part barley, ground very fine (hulls sifted out) and mixed with milk.

The gains in both cases were equal but those in the crates were cleaner and had a

better appearance than those in the coops.

ARRANGEMENT OF WINTER HOUSING.

In the autumn the best stock was selected out and housed as follows:-

House.	. Breed.	. Age.	No. of Leg Bands.
No. 1 3 3 4 4 15 16 16 16 16 17	B. P. Rock	Pullets	101-125. 126-155. Old and several new. Old and new to 167. 201-225. 226-250.

They were fed the following dry hopper mash: Two parts bran, one part shorts, one part corn meal.

The grain fed was mixed as follows: Two parts wheat, one part oats, one part buckwheat, one part barley to all except No 1 which got one part cracked corn and one part wheat instead of two parts wheat.

It was found that the pullets in House No. 1 began to lay earlier, but later on the

pullets in House No. 2 laid more eggs.

A small feed of grain was fed about 8 a.m. and a larger feed was given in the afternoon. As many roots were fed as they would eat. Oyster shell and coarse grit were always where they could get them. A small quantity of beef scrap or blood meal was fed as required.

Each house had its supply box and the feed for the week was weighed in each

Saturday.

The birds were trap-nested and the eggs for incubation or that were sold for

hatching were from the best hens from a utility standpoint.

After we had selected out, for this Station, what we considered was the best stock, surplus shipments of good stock were sent to the Kentville Experimental Station and to the Fredericton Experimental Station. Cockerels of good quality were sold locally at \$2 each for White Leghorn cockerels. Eggs for hatching from selected stock were sold at \$1 for a setting of 15 eggs.

The houses with the peak roof and straw loft were found to keep the litter dry for

a longer period than the houses with the shed roof.

Reords of temperature in the different houses were kept during the winter and as soon as sufficient data are available to secure reliable averages it will be published.

CHARLOTTETOWN.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

POULTRY.

Very satisfactory progress can be reported from this Farm toward the establishment of a new poultry plant, which was only started during the season of 1913-14. Six colony houses of various types were built during October and November of that year, with a view of making a careful study of these different types as to their particular suitability for this district. It was rather late in the winter when these houses were finished and made ready for the birds, hence very little information regarding them could be gained, but, notwithstanding this fact, the results obtained, and which are recorded in this report, were most encouraging.

The flock at present is made up as follows: Wyandottes, forty-nine hens, twenty-five pullets, two cockerels and three cock birds; Barred Rocks, forty-five hens, forty-five pullets and four cockerels; Single Comb Leghorns, twenty hens, twenty-six pullets,

one cockerel and one cock bird.

These were placed in different houses and a careful record of the fertility, hatchability, and livability of the chicks produced from the different breeds kept, which is just a continuation of the work started last season and is recorded here under experimental work.

NEW BUILDINGS.

The following new buildings were erected this year: One permanent house of the shed roof type, 16 feet by 32 feet, accommodating one hundred birds.

One brooder house of the shed roof type 12 feet by 14 feet, in which was installed a Caudee brooder stove, accommodating from three to four hundred young chicks.

An incubator and feed house, one and a half stories, 18 feet by 26 feet, with cement basement for incubators.

CONSTRUCTION.

The permanent house is built on a cement wall six inches by twelve inches underneath which is a trench 18 inches by 18 inches filled with broken stone. This not only affords a solid foundation, but likewise acts as a drain. The floor was laid with three inches of cement, protected from the damp soil by six inches of broken stone and gravel, thus insuring a dry floor, which is very essential in a poultry house. Small wooden plugs were inserted in the unhardened cement to allow the sill to be spiked down tightly to the wall. All material used for the frame work was two by four inchesentling, except for rafters. In the case of the corner posts and plates two pieces two by four inches nailed together were used. Rafters were two by six inch scantling placed at two feet centres. For boarding in nine inches planed boards with two-inch battens were used. The roof was single boarded and covered with paroid roofing.

From the accompanying plate it will be seen that the front of this house, which is seven and a half feet high in the front and five and a half feet high in the back, is about two-thirds cotton and one-third glass; the cotton screens are hinged so that they can be kept open on fine days. The four windows have twelve lights each 10

by 12 inches.

As the building is divided into two pens it will be noted that there are two glass windows to each, one large cotton screen in the centre and two smaller ones on each side. This seems to make an ideal front, permitting plenty of fresh air and light.

The sheathing is single ply seven-eighth inch board except the portion of the north wall around the roost, that is up the back, on both ends and over top, width of roost only. Acovable nests are placed underneath drop-boards, these being about two and a half feet from the floor. Small cages are made in both pens for the male birds, just at the ends of the roosts near the centre of the building. While this type of house has been used only one winter it has nevertheless given very satisfactory results.

The brooder house which is much the same type of house was built on two six by six inch runners to allow moving from place to place. All frame work was two by four inches. The building is six and a half feet in the front and five and a half feet at the back. It is sheathed on the outside and inside of the studding with well seasoned three-eighth inch matched lumber. The front is nearly all glass as will be noted from the plate. Only a strip along the bottom of the windows is sheathed. All windows are hinged at the bottom to allow opening in at the top, thus preventing a direct draught on the young chicks.

As before stated this building is heated by a Candee brooder stove, which, so far, has given fairly good results, though there is need of slightly better ventilation in the

house.

The incubator and feed house is built on a side hill, so that the ground level starts at the top of the cement wall at the east end and slopes off to the bottom of it at the west end, thus making a portion of the basement beneath the surface.

The cement wall upon which the building rests is seven feet high and 12 inches thick made of No. 1 Portland cement one part and five parts good gravel. Underneath this at the west end and part of the way back on both sides is a trench three feet deep and two feet wide filled with broken stone to protect the wall from frost, for at this end the bottom of the wall is on the ground level.

The floor is also of cement one part to six of good gravel, on top of six inches of broken stone to prevent dampness. All material used was good spruce and hemlock scantling two by four inches for studding and plates, two by six inches for rafter and sills and two by ten inches for joists. The building is fourteen feet in the post with a fifteen foot rafter. The walls were lathed and plastered. The house has also a double floor with building paper between. The roof was single boarded, then heavy paper and shingles laid four and one-quarter inches to the weather. The sides and ends were single boarded and covered with heavy building paper, then clapboarded. Windows were placed in each room to admit plenty of light.

The basement is divided into two rooms, one being used for incubators and the other for heating water and dressing poultry. The first floor is divided into three rooms, one is used for the keeping of records, the second as a room for the poultryman and the largest room for a feed room, the top storey is for the storage of feed, etc.

This plant is now permanently located in a three acre triangular field just east of the main barns. It is being fenced with turned cedar posts set one rod apart and electric-weld poultry wive. This makes a most attractive fence, when nearly put up. Inside of this again a number of smaller runs were built in front of each pen, for the breeding flocks during part of the year. The Page poultry wire was used on these in order to test out the durability of the two wires. The poultry plant is really the centre of attraction, being surrounded on all sides by the main driveway of the Farm.

The prices of eggs in this locality have been slightly better on the whole during the past season than they were for the previous year. In the case of farmers having regular customers the average for 1913-14 was 29.9 cents per dozen, while for 1914-15 they received 30.8 cents per dozen, but taking the country store eggs and those sections some distances from the market the average price would not be over 20 cents per dozen.

NAPPAN.

Dressed poultry has been in good demand and would average about 22 cents for crate fed birds. Country stock, not crate fed, would be somewhat cheaper.

Breeders have reported a much better year in sales of breeding stock than that for 1914, in fact they apparently experience difficulty in meeting the demand. The Barred Rock, as yet, seems to hold the preference as an all-round bird, though the White Wyandottes are very close seconds. So far as breeding stock goes the Barred Rocks have given at this Farm a higher percentage of fertile eggs.

INVESTIGATIONAL WORK.

As it was very late before any work of importance could be started last year, due to the fact that the buildings were not ready for the birds until late in December, the experiments as outlined were not as complete as they might have been. However, very good progress is now being made and tests now under way will be continued for at least three years.

COTTON-FRONT HOUSE.

The cotton-front houses built during 1918-14 were the first erected on this Farm. Though they have been used for only two winters it can be said that so far they are proving to be very useful houses for even this most changeable climate. All breeding stock wintered in these houses have given goodly returns considering the circumstances and have come through the winter in excellent condition.

During the winter of 1913-14 the thermometer dropped as low as 27 degrees below zero, yet none of the birds suffered from the frosts. The Leghorns were the only ones that showed any ill effects and even these were not very serious, as only part of them had their combs frozen badly.

During the winter of 1914-15 equally good results have been obtained from the various houses. The houses with two parts cotton and one part glass have given best results so far, proving to be the driest. This type has a floor space of about 114 square feet or 4.5 square feet per bird, a cubic air space of 693.5 cubic feet or 27.7 cubic feet per bird, an area in cotton of 43.3 square feet and in glass 19.1 square feet. The lowest temperature recorded in this house during the winter was three degrees below zero in February, and the highest was 67 degrees in March. More definite data regarding these houses will be available for the next report, as we shall then have the results of three years' work.

EXPERIMENTAL FARM, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. S. BLAIR.

POULTRY.

The poultry work at this Station has made fair progress during the season. Mr. C. E. Boulder, who was poultryman, gave up his work to take up studies at Macdonald College, Que., and it was some time before a suitable man was secured. The plant has been increased and the stock, by the addition of good male birds, has been considerably improved. The incubators were placed in the root cellar of the barn, which was not entirely satisfactory.

BUILDING CONSTRUCTED.

The large poultry house twenty-five by eighteen feet has been converted into a feed and incubator building. A cellar was constructed and the building moved to the foundation in a better location. This gives a nice large cellar for the incubators, which was greatly needed. A feed room, egg room and office have also been fitted up in this building.

A new house thirty-two by sixteen feet, for one hundred hens, was also constructed. This is a very satisfactory type of house. It has a shed roof and two-thirds of the front is cotton and one-third glass. It is dry and not too cold.

INCUBATORS.

Two incubators were used during the spring, one the Nonparcil Tamlin and the other the Prairie State. The former has a capacity of 200 eggs and the latter 390 eggs.

CHICKENS.

There were 449 chicks hatched in the spring of 1914. On June 1, there were 323 healthy chickens. After this date a considerable number were taken by hawks, the roultry yards being located near a thick patch of bush which, however, has since been considerably cleared and it is thought this trouble will be largely overcome in the future.

STOCK CARRIED DURING THE WINTER.

The laying and breeding stock carried during the winter was as follows:-

	Males.	Hens.	Pullets.	Total.
Barred Rocks. White Wyandottes. Rhode Island Reds. White Leghorns.	10 5 3	30 14 4 3	132 45 20 30	172 64 27 36
Total	21	51	227	299

WINTER RATION FOR HENS.

The whole-grain mixture fed to the hens during winter was as follows:-

300 pounds corn.

100 " wheat. 100 " oats.

100 " barley.

This was fed in deep litter at the rate of three quarts per day for twenty-five birds. The first feed of one quart was given at 8.30 a.m., and two quarts were given at 3.15 p.m. Care was exercised to see that the feed was well cleaned up and in case some was left the feed was decreased.

In addition to the whole grain ration a hopper of dry mash was before the birds at all times. The dry mash was composed of equal parts by weight of wheat, bran, middlings, corn meal and ground oats. After March 1, the dry mash feed was changed to 200 pounds bran, 100 pounds oats, 100 pounds middlings, and twenty-five pounds oil meal. Each pen was also supplied with beef scrap, oyster shell, charcoal and grit.

CRATE FATTENING HENS.

During August twenty-four hens were crate fed for market. These were divided into two lots of twelve each. Lot No. 1 was fed on a meal mixture made up of one pound ground oats, one pound corn meal, one pound middlings and one-half pound beef scrap. This was moistened with water for feeding.

Lot No. 2 was fed ground oats moistened with skim-milk. Both lots were fed one pound three times per day for the first week, and two pounds twice a day for the following two weeks. The feeding period was for twenty-one days. Water was given twice a day.

Weights at start and finish of the test were made after a fasting period of twenty-four hours.

,	Weight at Start.	Weight at Finish	Total Gain.	Average Gain.	
Lot 1	Lb. Oz. 53 8 55 2	Lb. Oz. 64 5.75 67 4.5	Lb. Oz. 10 13 75 12 2 5	Oz. 14·48 16·1	

The meal mixture and beef scrap cost as follows:-

100	pounds	oats					 	 	 \$2	00
100	44 .	cornmeal					 	 	 1	75
100	46	middlings.					 .\	 	 1	65
50	66	beef scrap	at	4	cents	3	 	 1~0	 2	00

\$7.40 or 2°12 cents per 1b.

The feed cost as follows:-

The poultry sold at 16 cents per pound.

Profit above cost of feed on lot 1, 90 cents per hen.

Profit above cost of feed on lot 2, \$1.35 per hen.

It will be noticed that No. 2, the skim-milk and oats ration, is much the better, for, although it cost 14.75 cents per hen for feed as against 13.58 cents for feed per hen for lot 1, the profit per hen was 45 cents greater.

KENTVILLE

EXPERIMENTAL STATION, FREDERICTON, N. B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

POULTRY.

At the beginning of the season the accommodation consisted of three colony houses having cotton fronts and straw lofts. In the early fall two permanent houses of 100 egg capacity each, were erected. An administration building with an incubator cellar was also built. A portable brooder house was built in March, 1915, and a Candee brooder installed.

INCUBATORS AND BROODERS.

There were three incubators used, one Tamlin hot water, 200 egg capacity, one Prairie State hot air, 250 egg capacity, and one Essex hot air machine, 120 egg capacity.

In February, 1915, a 1,200 egg Candee Incubator was installed in the basement of the poultry administration building.

STOCK AND BREEDING.

The stock in the spring of 1914 consisted of 31 Rocks, 22 Single Comb Rhode Island Reds, 14 White Wyandottes, and 20 White Leghorns.

Breeding stock was selected from birds of good type and vigorous constitution having regard to their records for egg production, as shown by our trap nest records. They were mated to vigorous imported males from heavy laying strains.

The number of chickens raised to maturity was 220; the power birds were culled out, crate fattened and sold at satisfactory prices. Eleven cockerels were retained on the Station and the rest were sold as breeders.

In December 30 Rhode Island Reds, 35 White Wyandottes, 15 Barred Plymouth Rocks and 30 White Leghorns were purchased to stock the plant to its full capacity.

The breeding stock mated up for 1915 consists of the following pens, viz.:-

Pens 1 and 2, 25 Rhode Island Reds in each mated to two males. Pens 3 and 4, 25 Barred Plymouth Rocks in each mated to two males.

Pen 5 50 White Leghorns mated to three males.

Pen 6 59 White Wyandottes mated to two males.

Pen 7 10 White Wyandottes mated to one male, bred to lay, strain received from Central Experimental Farm.

EGGS

Eggs were sold at prices ranging from twenty-five cents to thirty-five cents per dozen.

The following table shows the average number of eggs per bird per month with the prices realized. The average covers all ages and though by no means large is a fair record:—

	Price per	B. Pr.	YMOUTH -	W. WY	andottes.	S. C. R.	I. Reds.	LEGHORNS.		
	dozen.	Eggs. 5	Value.	Eggs.	Value.	Eggs.	Value.	Eggs.	Value.	
1914.	Cents.	No.	Cents.	No.	Cents.	No.	Cents.	No.	Cents.	
April May June July August September October November December 1915.	25	15·0 15·0 8·6 11·0 8·6 7·5 2·3 1·0 1·0	31 31 17 23 17 15 05 03 03	16·0 16·6 11·1 15·4 7·0 6·0 7·5 3·0 1·7	33 34 23 32 14 12 17 09 05	14 4 16 5 10 5 11 0 6 2 7 0 10 1 2 1 3 0	29 34 22 23 12 14 23 06 09	16·0 21·1 18·0 15·0 7·0 1·8	33 44 37 31 14 03 02 07	
January February March	35 35 30	2·5 5·7 14·1	07 16 35	2·0 4·6 14·3	06 13 35	2·4 6·8 13·1	07 20 32	3·0 4·0 12·8	09 12 32	
		92.3	\$2 03	105.2	\$2 33	103.1	\$2 31	101.7	\$2 24	

EXPERIMENTAL STATION, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, GUS. A. LANGELIER.

POULTRY.

Experimental work at this Station includes housing, feeding, and breeding, and it is the intention to furnish good stock and eggs at reasonable prices to farmers and other persons interested in aviculture. Attention also will be given to the marketing of the products in an attractive form, as this phase of the work is too often neglected, to the financial loss of the producer.

BUILDINGS.

A very neat and commodious poultry administration building was erected during the year. The dimensions are 18 feet by 26 feet and it has three stories, the basement, where the incubator, egg and killing rooms are placed; the ground floor comprises a mixing room, a bedroom for the poultryman, and a small office where records are kept and visitors received; on the first floor or attic are the feed bins and storage room for appliances, such as detachable brooders, coops, troughs, etc.

The incubator cellar has concrete floor and walls, the latter covered inside with a batting over which is grooved and tongued lumber. Wooden shutters can be let down over the small windows, to stop the radiation of heat or cold, and with this arrangement, the temperature keeps very uniform, having never varied more than four degrees, except on two occasions, during the months of March and April, while the variations outside ranged from five to twenty-eight degrees.

A ventilator of the Rutherford type helps to keep the air of the cellar pure and to control the humidity.

A laying house for 100 hens, 16 feet by 32 feet, was also built, and three colony houses, 8 feet by 12 feet. Thermometers are kept in the large house, also in one of the small houses, and maximum and minimum temperatures are taken twice a day. From these it will be discovered if there is a difference in utility between the deep and narrow houses.

STOCK.

Only one variety is kept, Barred Rocks. This does not mean that it is necessarily the best, but it was deemed advisable to keep just one variety, because there is not the accommodation necessary for more. There are about 125 hens and pullets, and six pens of 15 females each were mated. At the time of writing (April 21, 1915), about 200 chicks are hatched, some being about three weeks old.

EXPERIMENTAL WORK.

No experimental work was undertaken as the different buildings were creeted late in the autumn of 1914. Trap nests have been jut in all the pens, however, and already a few interesting things have been noted. For instance, some hens nearly always lay small eggs, some others lay eggs which are very often sterile, while others again lay eggs with weak germs. Egg trays have been made with a compartment for each hen,

and we have commenced to weigh the eggs of the different hens. Whether a hen laying small eggs will give pullets also laying small eggs can be found out, with time, but one thing certain is that the hen laying small eggs is not wanted as a commercial proposition. Though eggs are not yet sold by weight, the poultryman who puts large eggs on the market will no doubt keep his customers better than the one who delivers small eggs.

VISITORS.

Nearly all visitors are interested in poultry, as a great number of city people keep a few hens. With a man specially in charge of this work, and a convenient plant, useful information can be given and there is no doubt that the poultrymen of the district will be benefited by what will be done at this Station.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. M. McKILLICAN, B.S.A.

POULTRY.

On March 31, 1915, the poultry flock consisted of the following: Barred Plymouth Rocks: 15 hens, 35 pullets and 4 cocks.

White Wyandottes: 44 hens, 27 pullets and 6 cocks.

These are housed in six 10 foot cotton-fronted colony houses, which are in use summer and winter, being moved out to the fields in summer, and back nearer to the buildings and shelter after "freeze up." With the curtains up in summer they make cool airy quarters, and with them down in winter the houses keep dry and well ventilated, promoting health and fecundity, often lost in damp, close, airtight houses. Litter is provided to a depth of eight inches for exercise during the coldest weather and all grain fed into it. With a weekly addition of fresh straw and a monthly renewal of the cutire material, the surface is kept loose and the grain easily sinks out of sight. A dry mash of chopped grains with a small percentage of meat scrap added is always before the birds. Green food is supplied by roots and alfalfa leaves. Warm water is given in the winter as required. Grit and oyster shell are also fed in hoppers.

During the summer the houses were moved out to open spaces and after breeding was completed all hens ran together, and the cocks were killed. Wheat was fed in the dry mash hopper and a constant supply furnished. The hens did not get too fat and were away from the houses most of the daytime. This method reduces labour to a considerable extent. The hoppers have to be filled only about once in two weeks. Water was given every day, but at whatever time of day was most convenient. A grit hopper was filled with meat meal, but of this very little was caten, as the birds preferred insects and grubs to the dry meal. With this treatment they laid moderately well.

Hatching was started on April 6th in two incubators, one Cyphers hot-air machine and one Tamlin hot-water machine. Three cockerels had been put into each house and although the eggs were fertile, a large percentage failed to hatch on account of weak germs. This was probably due to the earliness of the season and also to the fact that the hens were confined. No appreciable difference was noticeable in the two styles of incubator but the hot-air machine was a good deal harder to keep up to the correct humidity in the egg chamber. The machines were run in a basement of which the atmosphere was very dry.

Beginning April 24, an experiment was conducted as to the difference between the results from artificial and natural incubation. One hundred eggs were put into a Tamlin incubator and 72 set under six hens. The eggs were as nearly alike in respect to breed and age as possible. The hens hatched out 16.8 per cent more chicks than the incubator, the figures being 61.3 per cent for the hens and 44.5 per cent for the incubator. These figures are based on the eggs remaining after the infertile ones had been removed at the first test.

At this Farm the chickens' enemies are undoubtedly crows and hawks which have taken a large number from one to eight weeks old.

After the chicks were about three months old, they also were fed by the hopper method which was very satisfactory. Young cockerels were moved away from the pullets as soon as the difference could be plainly seen. The first separation was made on August 10.

CONSTRUCTION OF COLONY HOUSES.

Six houses are used on this Farm, all of the portable cotton front type, the size being 10 feet by 12 feet.

Different methods of boarding up the walls were tried to see which would be the best for this climate. All of the houses have proven satisfactory and after this winter's

trial, the effectiveness of the open air house has again been demonstrated.

The houses were moved into a well-sheltered spot in the fall and placed in a line as close together as possible, facing the south. A self-registering thermometer was placed in each house and a record of the temperature kept. The houses were numbered from the west to the east, No. 6 house being the most exposed. The following description shows the difference in construction of the houses:—

No. 1.—Tar paper and one-ply of boards with an extra ply of boards on the back.

No. 2.—Double boarded outside of stude all over.

No. 3.—Same as number 1.

No. 4.—Tar paper and one-ply of boards.

No. 5.—One ply of boards on the outside of studs and one ply on the inside of studs.

No. 6.—Tar paper and one ply of boards on the outside of studs and boarded up on the inside of studs just around the roosts.

The following table is representative of the temperature records obtained during the winter:—

Temperature Records of Colony Houses.

House 1. 2. 4. 5. 6. No. Temp. Birds 21. 34. 28. 35. 21. House. Min. Max Min. Max Min. Max Max. 0 1915. Jan. 4 30 - 1 24 6 -15.028.0 14 24 8.0 24 26 17.0 78 40 15 41 24 9.5 7.5 -18.06.0 11·5 20·9 -20-45.5 6 5·0 7·0 7·0 8 -33.5 -14 -14.0Feb. 4 4 20.0 30 14 20 43 46 14 64 41.0

Notes.—No 6 was always the coldest but it had fewer hens and was the most exposed.

No. 4 was always the next coldest but it had also few hens and was just enough warmer to allow for its extra shelter.

No. 1 was the third coldest: It was well sheltered by bush and had plenty of birds, but was somewhat damp inside and some of the birds had their feet frozen.

No. 2 gave much the same results as No. 1 except that it was drier and did not have quite as much variation in temperature.

BRANDON.

No. 5 gave the best results of all. It was no warmer than No. 3 but it had a much more uniform temperature than any of the other houses and was a great deal drier.

No. 3 house is the same in construction as No. 1 but was much warmer and drier. This may be explained by the fact that it had the greatest number of birds and was the centre of the row.

The temperatures were also taken on the roosts with the curtains down around the roosts and the difference between the temperature of the house outside the curtain, and the roost, noted. In every case the roost was warmer than the rest of the house, varying from a few degrees up to as high as 20 degrees. These results show that it is preferable to have a curtain to drop in front of the roost on really cold nights. Since the temperature can be kept from 10 degrees to 20 degrees warmer with a curtain it is well worth the trouble as it adds considerably to the comfort of the birds.

A record has been kept of the number of eggs laid by the hens in each house but no influence on egg production can be traced to the effect of the houses as differences in strain and age of the birds were more effective factors in determining the number of eggs laid.

PULLETS versus OLD HENS AS LAYERS.

Beginning on November 1, records of the eggs laid by the pullets and hens of each breed were kept. The Wyandotte pullets commenced to lay on November 13 and the Rock pullets on November 19. From this time on during the entire winter, the pullets gradually increased their egg production and the hens fell off in theirs till about the end of January. This shows that the pullet is essentially the winter egg producer. Another fact very noticeable here is that the White Wyandottes were much superior to the Barred Rocks as winter layers, but about February 15 the Rock pullets began to lay better and have kept up fairly well since then, although they have as yet at no time equalled the Wyandottes.

ROCKS versus WYANDOTTES.

There are several factors which may have influenced the egg production of these two breeds during the past winter:—

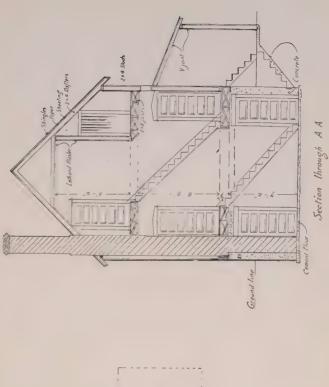
- 1. The Wyandottes are probably a better laying strain of their breed than the Rocks are of their breed.
- 2. Nineteen of the thirty-five Rock pullets were shipped from Ottawa, arriving here on October 17, and although they arrived here in good condition, it took them some time to become acclimatized.
- 3. The Rock hens were in an over-fat condition and the winter was well advanced before they could be made to exercise themselves sufficiently to keep them in laying condition.
- 4. The pullets of each breed were practically the same age, but the Wyandotte pullets seemed to mature earlier than the Rocks.

The birds were all fed the same rations, they all had the same sized runs, and were kept under as nearly the same conditions as possible.





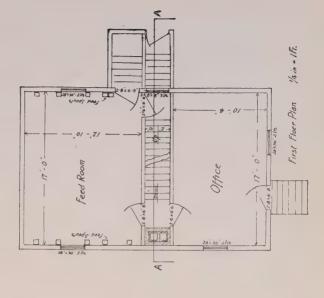
ADMINISTRATION BUILDING.

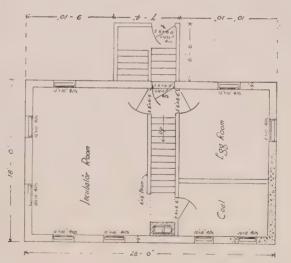


Second Floor Plan



ADMINISTRATION BUILDING.

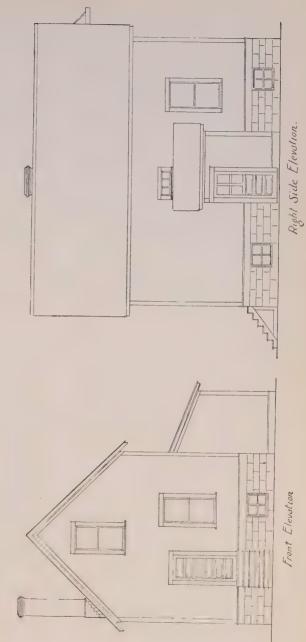




Basement Plan



ADMINISTRATION BUILDING.



Front Elevation



ADMINISTIRATION BUILDING.

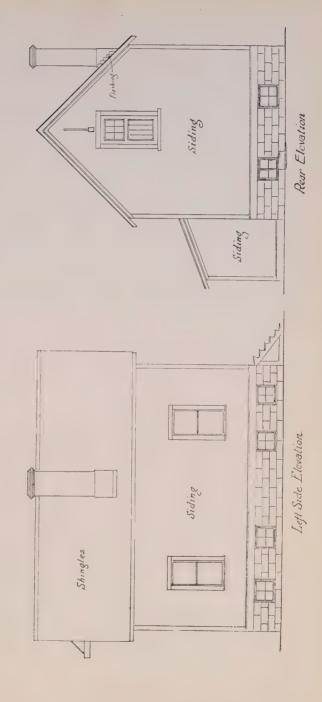






Fig. 7. Poultry Administration Building at Lethbridge, Alta. (front and south side).



Fig. 8. Poultry Administration Building at Lethbridge, Alta. (entrance from plant).





Fig. 21. Colony laying houses used at Indian Head.



Some early hatched White Leghorns. Photograph taken May 26, hatched early in March, English Strain, Lethbridge, Alta.





Agassiz, B.C., Poultry Plant. Breeding pens in front.



EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE ASSISTANT TO THE SUPERINTENDENT, K. MACBEAN, B.S.A.

POULTRY.

Two breeds of poultry are kept on this Farm. These are the Barred Plymouth Rocks and White Wyandottes. The reason of their choice over other breeds is due to their suitability to prevailing conditions in this district.

The strains in both breeds are practically new to this Farm, representatives of each having been introduced from Eastern Canada a year ago last fall while another shipment of Barred Plymouth Rocks and White Wyandottes followed last fall, also from the East.

The flock now consists of fifty-four Rocks and sixty-two Wyandottes.

Owing to the fact that most of the birds are practically strange to our conditions, results therewith are not conclusive, but the fact that the egg yield this past winter has been better than that of last, leaves the inference that, as the birds become acclimatized, results will be more favourable.

Previous to last fall's shipment of birds from Eastern Canada, it was decided to cull out rigidly all inferior birds in the existing flock. Those culled out were crate fed and sold, an experiment to compare different fattening rations being carried out with a view to determine the value of the various feeds.

BUILDINGS.

There being no permanent poultry building installed as yet at this Farm the birds are all housed in colony houses. There are four of these, two being large enough for twenty-five birds each, the other two having accommodation for forty birds each.

While the houses are similar, the following differences are worthy of note:—

No. 1 house: Building paper and one ply lumber (two ply round roost space), one sash glass, two cotton frames, board floor and shingle roof.

No. 2 house: Two ply lumber, tar paper between, all-cotton front, earth floor, shingle roof.

No. 3 house: Two ply lumber, tar paper between, cotton front and also glass 14 inches wide full length of front, earth floor, shingle roof.

No. 4 house: Two ply lumber, tar paper between, roost space sealed inside with beaver board, board floor, ruberoid roofing, all-cotton front.

To make reliable comparisons between the houses a thermometer was kept in each, all winter, but as the weather was extremely mild, no striking differences were noted and the birds thrived equally well in all houses.

The following table shows the variations in temperatures in the different houses:—

VARIATION in Temperature of Houses.

	Decer	nber.	Janu		Febr	uary.	Mai	rch.	A	ril.
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
House No. 1	30 28 28 28 28	21 14 14 22	42 39 36 40	28 18 22 28	44 38 32 36	16 8 6	52 54 52 56	0 8 2 0	96 58 84 94	20 22 24 22

EGG YIELD.

The egg yield varied slightly in the various houses but this was attributed, not to the superiority of one house over another, but rather to the better strain of birds in the respective houses.

In this connection it is worthy of note that the Wyandottes are excelling the Plymouth Rocks in egg production and, therefore, an effort will be made to bring out all the possibilities of this breed since this Farm seems to be fortunate in possessing a good strain of laying Wyandottes.

METHODS OF HANDLING.

Pullets are kept in houses separate from hens. Trap nests are used in recording the yield of the individual pullets but not in the case of hens. As a result of trap nesting the pullets, only such as come up to a good standard are retained in the flock, their eggs the succeeding year being used for hatching purposes. Pullets that do not come up to a desirable standard are culled out and fattened. Birds are usually kept two seasons only, as pullets and one-year old hens, but in cases where they have proved to be exceptionally good birds they are retained a third year and then not for the number of eggs they may yield, but that a supply of desirable eggs may be obtained from them for hatching purposes. By this means it is possible to keep both flocks up to a high standard.

All chicks are hatched by incubators, of which we have two, viz., the Tamlin and Prairie State. These have been in use two seasons and both have given good results, the number of chicks hatched out this spring being one hundred and twenty-nine Rocks and one hundred and sixty-nine Wyandottes.

INCUBATION AND BROODING.

There are five brooders in use. Those of the adaptable type were satisfactory when the lamp was placed inside the brooder house. At the outset the brooders only were placed inside with chimney connecting brooder to lamp placed outside the house. This method was very unsatisfactory due to the fact that an occasional high wind would spring up and extinguish the lamp. The method of placing the whole equipment inside the brooder house was resorted to, and good success was the result, no appreciable effect of lamp fumes on chickens being observed.

Experience with all the hovers was such that we placed the whole equipment inside the respective brooder houses.*

In conjunction with the two small portable brooder houses, two colony houses are also being utilized for the raising of the chickens.

SUMMER CONDITIONS.

When the breeding season is over all the hens are allowed to run together, two houses being sufficient to accommodate those selected for the upkeep of the flocks, while those culled out are put into the fattening crates. The other two houses are thus available for the raising of the chickens and are transformed into brooder houses.

The poultry runs are situated partly in a cultivated orchard while one end of these runs is taken up with an old alfalfa patch where there is an abundance of green feed available.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

POULTRY.

In 1914 a start was made with poultry at this Station. During the latter part of the winter of 1913-14 three incubators were purchased and installed in one end of a "dug out" root cellar and although we did the season's hatching with the incubators located there we found that it was not very satisfactory owing to the difficulty of keeping the temperature of the room sufficiently high, and of supplying proper ventilation.

As we obtained no fowls to start with, all the eggs used were shipped in from a considerable distance, except some Single Comb White Leghorn eggs which were purchased locally. The eggs were supplied principally from the Central Experimental Farm, Otiawa, and from the Station at Lacombe, although some were shipped from the Farm at Agassiz.

BUILDINGS AND FENCING.

During the summer the following buildings were constructed: An administration building, a one and a half storied structure, 18 by 28 feet, with full basement. In the basement is an incubator room, an egg room and a small room for the storage of coal. On the ground floor is an office and feed room, and on the first floor a bedroom for the attendant, and a room for storage.

A broader house 14 by 28 feet was built with a centre division making two rooms of equal size. One room was used for broading and in it was placed a coal-oil broader stove, the other for a scratching place for the chicks.

A one hundred hen permanent house, and two fifty hen portable houses were built. The one hundred hen house was 16 by 32 single boarded, except adjacent to the roosts, with a front part cotton and part glass. The portable houses were built half as long and similarly constructed except in regard to some minor points. A floor was put in one of the portable houses but not in the others. The average temperature in the floored house was lower in extremely cold weather than was the case when the earth floor was used. In our dry climate there appears to be no disadvantage in not using any artificial floor.

About three acres containing a row of cottonwood trees and a row of caragana on three sides were fenced with a woven wire fence. In addition to this some cross fences were put up as well as fencing for a number of runs.

STOCK.

The incubating was started rather late and for various reasons the number of chickens obtained was somewhat limited. There were in all 310 chickens matured, 100 of the best pullets were saved and the balance were chiefly disposed of by fattening and selling locally. These 100 pullets saved consisted of 60 Single Comb White Leghorns and 40 Barred Rocks. This stock was added to in the Fall by 40 Single Comb White Leghorn hens of good English stock and six cockerels and 60 Barred Rock hens and six cockerels, thus bringing the stock up to 100 each of Single Comb White Leghorn and Barred Rock hens.

WINTERING.

As has been stated the houses were all single boarded except adjacent to the roosts and dropping board. In front of these is a cotton curtain which was let down at nights during severe weather. The Barred Rocks were kept in the permanent hen house and the Leghorns in the two portable houses. All pullets were trap-nested and a careful record kept. The lowest temperature during the winter was 18-0 degrees recorded above roost in the portable house with board floor. The other houses showed a minimum of at least 3-0 degrees higher. The difference in temperature inside, *i.e.*, beneath the curtain, and outside of roosts clearly showed the value of this curtain.

The poultry wintered in a satisfactory manner. The coldest outside temperature was 26.5 below zero and in one case only was a comb frozen to any extent, viz., in the case of a Single Comb White Leghorn male bird.

FEEDING.

A deep litter of four inches to six inches of straw was kept constantly on the floor of scratching pen, in which whole grain, consisting of wheat and some oats was scattered night and morning. A wet mash composed of equal parts of wheat, oats and peas, was given once a day, and a dry mash, usually accessible, composed of ground peas and barley meal. Cut green bone was supplied daily, when obtainable, about one-half an ounce per bird daily being fed. Green feed consisted chiefly of turnips supplemented by a daily supply of alfalfa.

The work this year has necessarily been of a preliminary nature, but we feel that it is well started and that the notes relative to trap nesting, feeding, incubation, etc., now started will be of value and interest another season.

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

POULTRY.

The number of poultry at this Station on March 30, 1915, is 253 hens, 22 ducks,

9 geese, and 16 turkeys, all of which are in good health and laying well.

A number of improvements have been made during the year, including the erection of a six foot fence around the yards, and alterations in the straw house and in the long frame house. Under the arrangements first provided in the incubator cellar the machine smoked and it was necessary to erect a new chimney, but the trouble in this connection is now over. A coal oil brooder used in 1914 has been displaced by a coal heater. The coal oil heater was expensive to operate, while the coal heater is much more dependable and can be operated at a cost in average weather, of from twelve to fifteen cents per day.

TEMPERATURE IN FRAME vérsus STRAW HOUSE.

Records were kept of the temperatures in the large frame house which accommodated about one hundred birds and in the straw house which has a floor space for about eighty birds. During the latter half of January, through February and the latter half of March, while the temperature was higher in the frame house the birds in the straw house did not suffer.

FRAME versus STRAW HOUSE.

FRAME HOUSE.

1915.	Average Maximum. Temperature.	Average Minimum Temperature.	Mean.
	0	٥ ،	٥
January February March	33·8 38·5 44·0	16·9 24·6 24·4	25·4 31·6 34·2

STRAW HOUSE.

1915.	Average Maximum. Temperature.	Average Minimum. Temperature.	Mean.
		٥	۰
January February. March.	26.6 33.9 40.4	5°7 12°3 14°2	16·2 23·1 27·2

HATCHABILITY OF EGGS FROM DIFFERENT HOUSES.

Eggs from various houses have been set and records kept with the object of establishing a relation, if such exists, between the character of the house and the hatchability of eggs produced in it.

VARIATION OF HATCHABILITY.

House.		Breed.	•	-	No. Set.	Hatched.	Per cent hatched.
ong		n, Barred Rock,					
- C	White Wyar	ndotte			365	141	38.6
quare	Buff Orpington	n			167	95	56.9
log	Rhode Island	n	ck. Buff (Orbington.	290	153	52.7
	White Wyar	dotte			303	94	31.0

Note.—The different breeds have much to do with the variations in egg hatchability.

COST OF OPERATING INCUBATORS AND PERCENTAGE OF EGGS HATCHED.

The equivalent of one hatch has been brought out in the Candee machine which has a capacity of 1,200 eggs, one hatch in one of the Cyphers machines and two in the other Cyphers, both having a capacity of 140 eggs each.

The nut coal used in operating the Candee machine cost \$8.50 per ton, and 20 pounds per day were required. The Cyphers machines each require one quart of coal oil per day. The coal oil costs at the rate of 23½ cents per gallon. The above are cost items used in determining the cost per hundred eggs to operate and the cost of one hundred chickens hatched in the different incubators in the following table:—

COST PER CAPACITY AND PER NUMBER OF CHICKS HATCHED.

Incubator.	No. of eggs set.	No. of eggs hatched.	Percentage hatched.	Cost per 100 cap. to operate.	Cost per 100 chicks batched.
Candee 1 hatch	1,121 433	517	46.1 41.4	ets. 14.8 88.12	\$ cts. 0 35 2 09

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

POULTRY.

Under the management of Mr. V. Kuhn the extent of the work in poultry has been considerably increased during the year. As before we have limited ourselves to the two breeds, White Leghorns and Barred Plymouth Rocks. In addition we have kept some ducks and squab pigeons have also lately been added to the stock.

STOCK.

· The total number of birds kept was 468. These were divided as follows:-

Variety.	Hens.	Pullets.	Totals.
White Leghorns Barred Plymouth Rocks Males of both breeds Ducks Pigeons	190 42 15 8 20	102 91	292 133 15 8 20

The high prices of feed and the low market value of poultry products have been intensified this year and experiments have been directed towards the cutting down of the cost of production. The results of the work are grouped under three heads: Production, Breeding and Experimental Feeding.

PRODUCTION.

The flock was not divided to the best advantage for egg production this year, since over one-half of the stock kept consisted of old hens. The egg yield per month for the year was as follows:—

April May June July August September .	4,183 3,608 3,197 2,696	October November. December. January February. March	733 1,733 2,893 4,029	
Totals 2	20,947		17,191	

The average yield per bird was 89.7. This figure is computed from the total number of females in the pens: The range, according to the record from the trap-nests, was from 210 by the best, to 44 by the least productive, during the whole year. The larger number of summer as compared to winter eggs was due to the predominance of old hens, which laid the major portion of their eggs during the summer.

Remir and Lete Pillers (Laustians).

A comparison is given over our one tag performs we of early-nationed Walto Reporting Duling to the first policy of the same of

Barry of a Line Har and White Legaria Pauria.

Manual Annual An		
-	1 . ,	iare rates-s
Number of birds in pen. Number of days in trial. Amount of grain fed. Ib. Amount of green food fed, Ib. Amount of skin milk fed, Ib.	179 1.79 1.79 1.79 1.79 1.70 1	53 101 1 11 2 2 5 5 1 10 2 0 7 10 135 10 135 11 122 1 15 1 43 3 19 cta. 2 1 1 cta.

The extremely high phice paid for feed during the counter months put the cost of particles are high but this fact proves the absolute accessity of scepling only the best producers.

from an egg producing point of them, with White Legisteria, it would appear that the range, refore putting them into laying pens.

BARLY AND LATE PULLETS (BARRED ROCKS).

The construction was made between Bornes Plymouth Rock pullets of early and are naturally. The pullets of direct trail ere of milest trailer.

Early rersus Late Hatched Pullets.

- Applicated	Early Hatched.	Late Hatched.
Number of days in trial Amount of grain fed, lie Amount of grain fed, lie Amount of grain fed, lie Amount of skine-milk fed, lb Total number of eggs Weight of	11.7 1.7 1.7 1.15 2.41 1.1. 6.11 6.11 6.	45, 110 1, 107 201 1 (66) 1 (67) 2 (22) 27 (54) 40 (26) 1 (67) 2 (44) 7 (40) 2 (42) 17 (40)

SESSIONAL PAPER No. 16

In the case of the Barred Rocks also, the early hatched pullets gave the more profitable returns, but there was not as much difference with this breed as with the White Leghorns. In the pen of early hatched pullets, one cockerel was run to twemy-three birds. We attribute the very poor hatching to the large number of pullets, the feeding for egg production, and continuous close confinement without shade during the breeding season.

PULLETS versus HENS.

Early hatched White Leghern pullets were compared as to performance with their mothers, two years old.

Pullets versus Hens for Egg Production.

	Pullets.	Hens.
Number of birds in pen Number of days in trial Amount of grain fed, lb Amount of green food fed, lb Amount of skim-milk fed, lb Total number of eggs laid Number of days per hen per doz. eggs Pounds of grain per doz. eggs Pounds of grain per doz. eggs Pounds of skim-milk per doz. eggs Cost to produce 1 doz. eggs Per cent. eggs fertile Per cent. of fertile eggs hatched Per cent. of total eggs hatched	49 170 1.811 200 855 1.618 61:7 9:72 1:47 -6:26 21:5e, 85:8 57:1 49	64 120 1,396 244 666 818 112 6 20 4 3 58 5 25 41 7c 80 3 43 3 43 3

From the above figures we must conclude that pullets only should be relied on for winter egg production. The strong healthy pullets in this instance gave better fertility and hatchability than did their mothers.

SELECTED AND UNSELECTED PULLETS.

We give also a comparison between two lots of Barred Plymouth Rock pullets, both late-hatched. One was a selection of pullets bred on this Farm for a number of years, and the other was composed of mixed strains. They were all hatched and raised together.

Selected versus Unselected.

	==	
	Selected birds	Mixed strains.
Number of birds in pen. Number of days in trial Anomat of grain fed. lib Amount of green food fed, lb A ount of skim-milk fed, lb Number of eggs laid. Weight of eggs, oz. Weight per doz. of eggs, oz Number of days per hen per doz. eggs Pounds grain per lb. eggs Pounds grain per doz. eggs Pounds of skim-milk per doz. eggs Cost to produce I doz. eggs. Cost to produce I doz. eggs. Cost to produce I doz. eggs.	20 147 174 189 459 817 1,643 45 5 77 6 74 17 75c.	25 151 583 283 550 800 1,549 23 2 54 6 11 6 10 65 8 25 31 49c. 21 67c.

In a year such as this, with high price of feeds, it certainly paid to cull a fleck, and to keep only those of known egg-laying strain.

BREEDING.

The breeding stock this year was carefully selected, and we bred as far as possible from the best strains we had. We have trap-nested two lots of pullets, but as these do not finish their year till next autumn, we do not know exactly how they are going to produce. So far there is a great variation, depending upon their breeding. As a rule, however, those which started laying earliest in the autumn have done the best work.

This year we received from the Central Experimental Farm, Ottawa, five bred-tolay White Leghorn cockerels, and from the Maine Experiment Station, one bred-to-lay Barred Plymouth Rock cockerel. These we used for the improving of our own strains.

In view of the recent discussion concerning the number of hens which could be mated to one cockerel, we this year increased the proportion of females to males. It is possible that the poor results of this change of method were due to factors which we could not control, such as shortage of green feed, lack of shade, etc.; but the fact remains that the percentage of chicks was lower than usual. Also, in one pen, where fewer hens were put to one cock, the fertility and hatching power were far greater than in the other pens. We cannot claim that these results are conclusive, however, since the trial was not sufficiently extensive. More work could profitably be done on this question. Below we give in tabulated form the performance of two pens: One contained five hens to one cockerel, the other thirty-two.

Five versus Thirty-two Females to One Cockerel.

	One cockerel and five hens.	One cockerel and 32 hens.
Percentage of eggs fertile. Percentage of fertile eggs hatched Percentage of total eggs hatched.	92·9 78·7 73 <u>·</u> 2	80°3 43°3 34 8

Both of these pens were composed of old hens, and the two cockerels used were full brothers. The figures represent the average of the whole season, and the hatching results of four different incubators.

INCUBATORS.

There are five makes of small incubators in use here, Prairie State, Jubilee, Tamlin Nonpareil, and two Cyphers. They were all run in a small cellar, the temperature and humidity of which were uniformly good throughout the season. Last year we gave a detailed report of the rost of raising chicks, calculating on the initial cost of the machine, and the quantity of oil used at 30 cents per gallon. This year we obtained oil at a cost of 22 cents. The following are the averages of three hatchings:—

Cost of Incubation.

	Prairie State.	Jubilee.	Tamlin Nonpareil.	Cyphers No. 3 Avg. of two.
Capacity of machine, eggs Cost of machine Average gal. of oil for 21 days, gal Average cost per 21 days oil at 22 cents per gal Average cost of oil per chick hatched Average cost per chick, calculating 10 % cost machine.	\$30 2.85 62.05c.	100 \$25 2 65 59.05c. 1.06c. 1.48c.	100 \$35 2.75 60.05c. 1.37c. 2.653.	350 \$52 4 16 91 05c. 0.68c. 1.29c.
Average total cost per chick	2 99c.	2.54c.	4·02c.	-1.97e

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The average cost of all machines last year was 2.81 cents per chick with oil at 30 cents. This year, the lower price in oil (22 cents) about counterbalanced the poorer hatch, for the average cost per chick was 2.88 cents.

REARING.

In connection with the breeding work also, we are able to give figures on the cost of raising chicks to five weeks of age, under a Candee Stove Heater. After five weeks they were fit to be put on the range and eat a mixed grain ration.

Cost of Rearing Chicks to Five Weeks.

No. of Chicks.

Number of chicks lost first week. Total number lost.	369 37 43 326
Temperatures.	
Max. temp. of hover	*8.
Coal used for period, 354 pounds at \$12\$2	10
Coal used for period, 554 pounds at \$12 \$ 2	12
Food,	
Bread eaten for period, 21 pounds at 3 cents	92
Eggs and Incubation.	
Total cost of eggs used	

The chicks were broaded in a cotton-front poultry house and after the first week, practically all the cotton was raised, thus giving them open air conditions throughout the trial. The coal broader stove gives excellent satisfaction.

Total cost of 326 chicks to five weeks of age...........

Total cost per chick five weeks old

EXPERIMENTAL WORK.

In connection with some experimental work which is not yet ready to publish, some trials were run through to test the effects of certain well-known feeds when fed exclusively. The table below gives the details of the trials, and needs no further comment. The fowls were kept in open-front colony houses, and given plenty of floor space, but were not allowed out. The food for each pen was carefully weighed every day, and the fowls were given just as much as they would consume and were supplied with abundance of clean water. The base ration consisted of wheat, corn, oats, barley, and peas. The starvation ration consisted of the same material but in a minimum quantity. That is to say, the fowls in this pen (No. 11) received each day a portion of the full base ration, equal to the minimum amount consumed by any of the pens on the day previous.

AGASSIZ.

\$31 56

46 60

The addition of Inorganic Phosphorus to Poultry Rations. Feeding period seventy-nine days.

27			Tanana	arra Never	000				
No. The Bans and VRIGHTS.	- '	Individual Nu The Birds Wright	BIRDS WRIGHT	MI A	EERS OF	Change	No. of eggs	Condition of eggs	Romanks
,	No.	- 1	At b	÷ 50	At end.	weight.	laid.	laid.	TO THE PERSON NAMED IN COLUMN
	1b. 46 48		.e. 4	9	All died.	Ib.			After 31 days, birds all became weak in the legs. Ate sparingly and gradually be-
Wheat flour, best grade, bake 8.125 90 91 3.5 ed, and inorganic phosphore 121 318 318.	219 219		90 40 00 00	.a → oc t -	3.4 2.15 1.9	-4.15	m	Small, yolk white	came conatose. They were all dead on the Höld day. Two burds died with the same symptoms as those in pen I. Bird No. 90 recover-
	95		4000	8180	20.00	-1.7	4	Normal	ed and laid eggs, but showed leg weak- ness. No. 95 was apparently a weakling; would
4 Rice meal, baked in cakes 20.25 96 4-1 7 3-6 4-1 7 2 8-8	22,28		a in its in	ာ ျပာထိ	1 to to :	6.0-	11	Small, yolk almost	not gut and other. The cuter two remained healthy throughout the trial. No. 72 was attacked and eaten by her mates, having become too weak to defend herself. Her bones very pliable.
and in- 38.75 234 25.	22,12,23		00 00 44 0	10 00 mg	00 00 40 4 70 00 4	F.0-		Small, yolks very pale,	Numbers 96 and 97 improved after eating their mate.
	8228		es es es es	0 10 20 20 C C C C C	1000	-1.2	H	Normal	Birds showed alternate periods of normal feeding and sickness. When feeding normally the droppings were very watery.
Cracked yellow corn, boiled. 27-25 35 35 35 .	32 32 32 32 32 32 32 32 32 32 32 32 32 3		0000	N ၁၈ က အ မ	4 4 2 4 6 0 0 % 10 f	-1:1	0 40	Very small but Borm	Birds kept in good condition throughout, but the droppings were very watery. Very small but norm Birds kept in fair condition, but droppings
	25 29.8 39.8 39.8		ବଳ ବଳ ବଳ	- 0 7 7 7	- H 13 C	₹.0-	ro ro	Normal in size and colour.	a in colour. Normal in size and No. 298 showed weathers in legs and recolour.
Corn meal, baked, and phos- 39.25 50 10 phorus.	2998;		50 50 50 5	<u></u>	ಲಾಲ ಲ ಯಗು 4	+0.2	r-		· =
	 22		4 4 30 84	4 4 20 00 4 0 10 10	4 62 62 8 5 00 10 4	-2.6	=	Normal	Birds were very hungry but were the most, healthy and active of all the birds.
43	247		3 50 60	000	44.	2.0-	18	Normal	Normal Birds in good condition all through trial.

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The inorganic phosphorus used in the above trials consisted of equal portions by weight of ground phosphate rock and basic slag. This was supplied in very small quantities. The above results are given simply to show the relative effect of the foods used on the health and condition of the fowls. From these results one sees that even the small amount of inorganic phosphorus helped to keep the birds in better condition when fed on rations normally low in this element.

Even in a ration of corn meal, which is not as deficient in phosphorus as some other feeds, there was a marked difference in the condition of the birds.

Another thing worthy of note is that when boiled rice or boiled corn was fed, they all seemed to have about the same laxative effect on the birds.

SHAPE AFFECTING WEIGHT OF EGGS.

A large number of eggs were measured and weighed in order to find out what effect the extreme dimensions had upon the weight. It was found that an increase in length or width above the normal was not always accompanied by an increase in weight. It appears that the degree of tapering either at one or both ends, has a greater influence on the comparative weight, than either of the extreme dimensions. It is important that all eggs so compared must be from the same day's laying, since there is an appreciable loss of weight after an egg is ten days old.

DUCKS.

Last season ducks were kept here for the first time. From a small lot that was hatched by hens during the summer, six ducks and one drake were kept, and one drake was obtained from the Central Experimental Farm at Ottawa. These ducks are of the Pekin breed.

The ducks were fed throughout the winter and breeding season on a mixture of:-

Bran, two parts by measure. Corn meal, three parts by measure. Shorts, one part by measure. Crushed oats, one part by measure. Pulped mangels, three parts by measure.

They had a small, shallow, cement pool to paddle in during the year, and were provided with a house, but they preferred to sleep outside during the entire winter.

On February 12 they commenced laying, and in the succeeding seventy-nine days laid 60.6 eggs apiece, making a total of 364 eggs.

Cost of Ducklings to Three Weeks of Age.

Total cost of food, 8 breeding ducks. \$12 81 Cost per duck. 1 60 Cost per doz, eggs. 42.2c.		
Cost per egg. 3.5c. Hatching 40 ducklings	\$4	33
Cost to rear 40 ducklegs, 3 weeks	4	46
Cost to rear 1 duckling, 3 weeks	\$8	79

These results are taken from the early part of the breeding season. The work is still going on at the time of writing. Much more work will be done in this branch of poultry keeping in the coming year.

AGASSIZ.

SQUAB PIGEONS.

We have recently made a beginning with pure-bred extra large Homer pigeons for squab rearing. The object of this is to collect information concerning this brauch of poultry keeping under our climatic conditions.

For this purpose we have erected a small, convenient pigeon house with a fly or coop attached to keep them confined. This confinement is to prevent the risk of carrying disease into the chicken yards.

EXPERIMENTAL STATION, INVERMERE, B.C.

REPORT OF THE SUPERINTENDENT, G. E. PARHAM.

POHLTRY.

The year's report, in a new Station such as this, must largely consist of an account of the preparations which are being made for future work. Last year we moved on to a 17-acre poultry run lying to the west of the Experimental Station proper, and suffered severe set-backs because we had been unable to have the runs in a proper state of preparedness.

The location is an excellent one, well sheltered from the south winds; the land slopes quite steeply to Tobey creek, and as the land is a sandy loam with gravel subsoil, there is excellent drainage, while the pine trees afford shade and shelter. The run is divided into four pens for poultry and two for turkeys. This year we have a building 22 feet by 20 feet ready for use, the upstairs providing a temporary dwelling for the poultryman, who will thus be able to give more constant attention to his charges. The basement is divided into incubator room, testing room and root cellar.

BREEDING STOCK.

Last year two varieties only were bred, one setting and one non-setting, viz.: Barred Rocks and White Leghorns. This season a second pen of Leghorns has been added. It is of the famous Barron laying strain, and they are exceptionally fine birds. There was also purchased a pen of Light Sussex; these are lately acquired imported stock and hardy last year's pullets. The Light Sussex make excellent table birds, and as the winter egg records show, have so far proved good winter layers.

BROODERS AND INCUBATORS.

The incubators and brooders used on the Station last year were of the Cyphers variety. The incubator, a 120-egg machine, gave excellent results. For this year's work a 200-egg Tamlin incubator and two Brett's Cabinet Adaptable hovers are being used as well.

BREEDING EGGS.

Eggs sold for hatching purposes were distributed to settlers during the breeding season, and very satisfactory returns were reported in every case heard from.

The chief losses suffered were from the depredations of crows, bawks and weasels, but this will be largely obviated during the present season by the presence on the spot of a resident poultryman, also from the fact that the underbrush has been cleared both in and adjacent to the runs, and a harbour for vermin thus destroyed.

The whole flock is in a healthy condition, and has been, through the whole season, particularly free from diseases.

6 GEORGE V, A. 1916

HOUSING.

In housing the birds gave entirely satisfactory results. Two cotton-front houses as described in Poultry Circular No. 7, and two utility poultry houses, of which a description was given in last year's report on page 988 were built. These latter seemed specially suited to our local requirements, and have a special feature which should recommend them to the average farmer. The scratching shed is detachable and makes a satisfactory and convenient brooder house at a time when the scratching shed is not needed.

TURKEYS:

There was one pen of turkeys last year, one gobbler and three hens, and thirty-five chicks were hatched. There will be two breeding pens this season.

REPORT

FROM

THE TOBACCO DIVISION

For the Year Ending March 31, 1915

PREPARED BY

The Domi	nion Tob	acce Hu	sbandman.		 · .			-	-			F. Charlan.
Manager,	Tobacco	Station,	St. Jacques,	Que.	 			-		-	_	O. Chevalier, I.N.A.
Manager,	Tobacco	Station,	Farnham, Q	ue.		-		-	-	**	-	O. Chevalier, I.N.A.
Manager,	Tobacco	Station,	Harrow, On	t			-			-		W. A. Barnet, B.S.A.

16-73



REPORT FROM THE TOBACCO DIVISION

The DIRECTOR,
Dominion Experimental Farms,
Ottawa.

OTTAWA, March 31, 1915.

Sir,—I have the honour to submit herewith the report of the Tobacco Division for the year 1914-15.

In addition to the report on the work at headquarters in Ottawa, and on the test plots of the Central Experimental Farm, there will be found herein reports from Mr. O. Chevalier, Chief of the Tobacco Station at Farnham, Que., from Mr. W. A. Barnet, Chief of the Tobacco Station at Harrow, Ont., and from Mr. G. C. Routt, Inspector for Ontario in 1914. Mr. Humbert, the Inspector for Quebec, being a French reservist, left for the front at the beginning of the war, in August, 1914. The report for the district of which he was in charge, as well as for the Station of St. Jacques l'Achigan, was compiled from his notes.

I have the honour to be, sir,
Your obedient servant,

F. CHARLAN,
Dominion Tobacco Husbandman.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

REPORT OF THE DOMINION TOBACCO HUSBANDMAN, F. CHARLAN.

The programme of this Division was summarized and explained in our previous report. The addition of two inspectors to our staff, enabled us this year to enlarge the scope of our work; one of these inspectors was put in charge of the province of Quebec, particularly of the north shore district, and the small tobacco Station of St. Jacques l'Achigan, the other one was put in charge of the province of Ontario.

These two agents were engaged at the beginning of the season. Mr. Paul Humbert, inspector for Quebec, belonged to the Tobacco Administration in France before coming to Canada, Mr. G. C. Routt, inspector for Ontario, belonged to the Experiment Station of Lexington, Ky.'

Character of the season.—The season of 1914, although better than the previous one was not, however, very favourable to the growing of tobacco. As a general rule, periods of hot weather alternated with periods of drought, and almost during the entire season of growth, the tobacco plants suffered either from the cold weather—or rather the lack of heat, or from the drought. The drought was our worst enemy. With the exception of a few light showers, the rain came very late, only at the end of the season. In some cases the plants were fairly well developed, but in most places, for instance at Farnham and to a certain extent at Ottawa, some varieties did not reach a sufficient degree of maturity.

In Ontario the conditions were a little more favourable. However, the Burleys were, as a whole, harvested later than in a normal year. The Virginias would have yielded a much larger proportion of bright yellow leaves if the end of August and

the beginning of September had been a little warmer.

In the Yamaska district, in spite of the difficulties under which transplanting was done and of the comparatively cold month of June, a satisfactory crop might have been harvested, had it not been for two hailstorms in August, which struck the crop when it was almost fully developed and destroyed a great number of tobacco fields.

Notes on some varieties.—Among the varieties grown at Ottawa, the pipe tobaccos and so-called Canadian tobaccos were more specially studied. We now have good types of Connecticut (Seed Leaf and Broad Leaf), very uniform. The size of the leaf is satisfactory, as well as the yield in weight. The earliness is medium. Our General Grant has not shown any variation for the last three years, the yield in weight is good and the product very popular on the market. The Belgian tobacco harvested in 1914 has not been appreciated by some manufacturers, as much as we thought it would be; the yield of this variety might easily be increased if it were planted at the same distances apart as the Comstock and, with a heavier crop, it could be sold for a lower price, the actual price being considered to be a little too high by purchasers. The small Havana and Tabac Rouge gave an unexpected yield in weight. These tobaccos, which may be considered as representing an almost pure variety, are of small size, they are very early and could be planted at the same distance apart as the Canelle (2 feet by 1 foot). Under such conditions, their yield would be such as to pay liberally for hand labour. They would be the varieties par excellence for the small farmers or for those who have large families.

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But of all the varieties tried in 1914, the most interesting is the Maryland. It is much to be regretted that we were not able to secure seed of better origin, but the leaves such as have been obtained—with a bright colour, pleasant aroma and light taste—will easily find a market in Canada. It will be necessary, however, to make a selection for earliness even if a slight decrease in yield should result therefrom, as the date of harvesting (September 14), is rather late for the province of Quebec.

Selection.—Selection work has been practised specially at Ottawa and at the experimental stations of St. Jacques l'Achigan and Farnham. At Harrow, our object was to ascertain the comparative value of various strains of white Burley, some of which were imported in the spring of 1914. The results of this test were not very conclusive; some of the strains introduced in 1914 do not show remarkable uniformity; none, in any case, has shown any superiority over the strain of White Burley that has been grown at Harrow for the last four or five years and which is derived from a selection made at the experiment station of Lexington, Kentucky.

Previous selections of Comstock Spanish gave us, in 1914, a few interesting strains, the seeds of which were distributed in the winter of 1914-15 to be grown under field conditions. As to the Yamaska and Big Ohio x Sumatra, we were able, in 1914, to make a mass selection for the first time; the seed harvested will be used as soon as there is a sufficient demand for the tobacco of these varieties. The selection of small Canadian tobacco has enabled us to isolate two strains almost fixed, which will be submitted to the manufacturers, as soon as a sufficient crop for a manufacturing test has been obtained.

A number of crosses were done at Walkerville by Mr. G. C. Routt, with a view to secure varieties resistant to *Thielavia Basicola* and also early strains for the production of yellow tobaccos. A small number of crosses obtained at St. Jacques and Farnham included special cigar varieties.

Tests with chemical fertilizers.—Since the beginning of our work, owing to the insufficient quantity of farm yard manure available, chemical fertilizers have always been used as a supplement on tobacco land, with the exception of the Ottawa plot where farmyard manure is used exclusively.

In some localities of Ontario where tobacco is grown on a large scale, there are practically no cattle. The only manure available is horse manure which is produced in a very limited quantity and hog manure which is not recommended for the growing of tobacco. In Quebec, the dairy industry, which is flourishing in other parts of the province has not developed to the same extent in the tobacco growing districts.

Therefore the use of chemical fertilizers for the growing of tobacco, is almost a necessity in most parts of Canada. A systematic series of tests was undertaken in 1914 at Farnham and Harrow to ascertain the most economical formula, that is the mixture of chemical fertilizers which would enable one to obtain, not the highest yield, but the most profitable yield per acre. No definite conclusion can be drawn from a year's test but, as will be seen in the reports of Messrs. Chevalier and Barnet, the formulae that were adopted at the start, after a study of the requirements of the varieties of tobacco generally grown, may be recommended.

One cannot, however, lay too much stress upon the importance of avoiding any chlorine in potassic fertilizers, as well as the mixtures specially prepared for the growing of potatoes, and which generally contain kainite or some form of potassium chloride. Unless these precautions are taken, the tobaccos will be incombustible and almost uselèss.

Methods of harvesting.—The necessity of reducing to a minimum the losses on the field after the tobaccos have been cut and of reducing the proportion of sand which remains on the leaves after the latter have long been in contact with the soil has compelled us to use movable stands.

These movable stands are very easily built. The only requirements are the following: (1) A sufficient height from the soil to avoid any contact with the latter. (2) Proper spacing of the laths so that the plants will not be too close, or too far apart. (3) The crop should be placed on the stand the same day that it is cut. Thus, injuries from the dew are avoided. The tobaccos should also be covered with damp-proof covers, in order to be protected from the frost during the night and also, to a certain extent, from the rain.

The tobacco plants should not be left as long on the stands as they were at Harrow in 1914. From three to five days are sufficient, according to the weather and the time available.

The crop should be hauled to the curing-house as soon as it has sufficiently wilted and the yellowing is well advanced. The use of these stands, by which the crop may take its yellow colour upon the field without being exposed to serious injuries, gives more time for the various operations: suckering, hauling of wilted tobaccos, cutting, laying on the stands, etc.; a better use can be made of the hand labour and there is a considerable saving of money.

Curing.—At Harrow, Ontario, an experiment was made to ascertain if the curing of white Burley could be hastened, and the colour of the leaves improved at the time of cutting, by splitting the stalk, according to the method practiced in Virginia, in Carolina and even sometimes in Kentucky. Owing to the lack of help at the proper time this part of the work had to be done somewhat too hurriedly and no definite conclusions could be reached.

Better success was obtained in Quebec where an experiment with charcoal heaters has enabled us to check the appearance of moulds during a long rainy season in the late fall, while hastening the complete reduction of the ribs, that is to say the end of the curing.

This experiment was even carried further. At the request of some manufacturers and tobacco dealers, arrangements were made to cure a crop of Comstock Spanish by the flue curing process.

The result of this experiment was not entirely satisfactory. But, if due allowance is made for the condition of the crop (it was harvested during a cold and rainy period), and considering the proportion of bright leaves obtained, it may be hoped that this process will give better results next year, when it is applied to mature tobacco with better texture (Virginias or perhaps General Grant or Connecticuts). The texture of the Comstock Spanish is much too fine for this process of curing.

Betuning.—A lot of broken leaves and leaves for fillers, from the 1913 crop, were submitted to this treatment. The formula used was supplied by the agent in charge of the St. Césaire warehouse, and applied under his direction. The results were most satisfactory. The products kept very well, no moulds were observed and even some parts of the leaves which were beginning to show signs of moulds became quite sound. When the bulks were taken down the tobacco gave off a pleasant smell, with a strict ammoniacal odour.

It is not known whether the tobacco treated with this formula would be liked by all manufacturers. In any case, considering the present condition of the market for Canadian tobacco, it seems that a great deal could be done in this direction.

Fermenting.—The grading and fermenting of our 1914 crop at St. Jacques and Farnham, were done at Farnham, in the warchouse of the J. M. Fortier Co., Ltd. This decision was taken for several reasons; the Ottawa warchouse was overfilled; it was desired to finish this work as quickly as possible so that the rest of the winter might be available for the distribution of seed, for the laboratory work and the pre-

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paration of our programme for 1915. Lastly, it was desired to have the products packed by an expert who is familiar with the needs of Canadian manufacturers, so that we might know exactly what grading is required by the latter.

The work was quickly done; it was finished at the end of December, thanks to the use of numerous help, and the products were fermented in boxes. The results would have been more interesting if it had not been necessary to discard a large part of the crop on account of injuries caused by hail in 1914; it was the part which would have supplied the largest proportion of fillers of first quality.

Inspection work.—This work was started on a small scale in the spring of 1914 with a view to ascertain, as fully as possible, the needs of the farmers whom it is our duty to help, their resources in land and material, and to discuss their problems and difficulties with them on the spot.

Our inspectors travelled chiefly in districts comparatively remote from our experimental stations, the districts around these stations being attended to by the superintendents. They were able, this year, to give us information on the condition of the seedlings, the preparation of the soil and, to a certain extent, on the areas planted in tobacco as well as on the condition of the crop and the process of the curing. They also made a summary examination of the types of soils met with in their districts. This work has already furnished interesting results which may be made use of as soon as tobacco growers have learnt that different soils require different varieties; that a variety which does well on a part of their farm may not be the best for another part where the soil is different. This choice of varieties according to the nature of the soils has a great influence over the quality of the products.

The report of Mr. G. C. Routt gives an idea of the work done. It contains a candid comparison between the Ontario and the Kentucky Burleys. This comparison, without belittling the advantages of the Canadian product. show to what extent improvements can be made.

One of the best results of this inspection work in Ontario is that the future of tobacco growing in comparatively new centres can now be ascertained. Tobacco growing in Canada, and especially in Ontario, is still in the embryo stage and can be greatly developed.

Unfortunately, the work of the Quebec inspector came to an end when he left for the front in August, 1914. Owing to the great variety of the soils in the part of Quebec where tobacco is grown, and the comparatively large number of varieties used in a small area, this work is perhaps more useful in Quebec than in Ontario, where, although the variation of soils is about the same, the number of strains grown is not so large. It is hoped that this most important work can soon be resumed and developed.

Our Quebec inspector, Mr. Humbert, was killed in action on the 8th January, 1915. The loss of this energetic, enthusiastic and highly competent officer is deeply regretted. How well he understood his duties, and how intelligently he was preparing to carry them out is clearly shown by the summary notes which he handed in before leaving for the front.

Control of diseases.—An experiment on the acidification of diseased soils, as a means of control against the root rot, Thielavia Basicola, was undertaken at Walkerville, Ontario, with the co-operation of Walker & Sons. The results obtained in 1914, which are stated further on by Mr. Routt, do not enable us to conclude in favour of this treatment, which, however, is recommended by specialists who have been experimenting on Thielavia Basicola. The experiment will be resumed in 1915 and an endeavour will be made to reduce to a minimum the risks of error and to follow as closely as possible the methods of application recommended.

Increase of the tobacco industry in Canada.—By this heading is meant the increase in the use of Canadian tobacco for manufacturing purposes, rather than the increase in the area actually planted.

As regards leaves for binders, there is an ever-growing demand for the Quebec Comstock Spanish and a fairly active demand for yellow, somewhat dry leaves which, unfortunately, were produced in rather large quantity in the Quebec northern district in 1914 and which sell at a fair price. The price of the Ontario Burleys has been cut down a little during the winters of 1913-14 and 1914-15, the purchasers claiming that the quality of the 1914 crop was not sufficient to justify them in accumulating large stocks, but on the other hand there has been a very strong demand for the flue-cured tobacco of the Virginia types, the growing of which is rapidly developing in southern Ontario as the production is not nearly equal to the demand.

If this yellow tobacco industry may be established in Southern Ontario, the growing of the White Burley may easily be transferred to the southeastern part of Ontario, the north shore of Lake Ontario and a part of the district between Toronto and Ottawa. Thus the area in tobacco could be increased in Ontario without any danger

of over-production.

Another industry is making rapid progress; the manufacture of cigars entirely made of Canadian tobacco. It is limited to the manufacture of cheap cigars of the "stogies" type, and little cigars. Nevertheless, owing to the popularity of these products and the enormous sale of the same, this industry consumes important and ever increasing quantities of Canadian tobacco.

At the present time, a demand which it would be urgent to satisfy is the demand for "fillers." It is hoped that this problem will soon be solved, at least to a certain extent, by means of strains imported from Ohio and Pennsylvania, one of which atleast has shown itself well adapted to the climatic conditions of Quebec and Eastern Ontario.

Publications.—Bulletin No. 21, 2nd series, Experimental Farms, entitled "Seedlings of Tobacco," was published during the year. It is an exhaustive study, in simple language, of the problems connected with the production of tobacco seedlings.

EXPERIMENTAL WORK AT OTTAWA.

The number of varieties or rather of strains of tobacco grown on the test plots of the Central Experimental Farm, has been considerably increased, owing to the necessity of developing the selection work started in 1913.

These varieties are the following:— 9 Comstock Spanish, 1 Yamaska, 1 Tabac Rouge, 1 Big Ohio x Sumatra, 2 Big Havana, 1 Big Ohio, 1 General Grant, 1 Connecticut Seed Leaf, 1 Connecticut Broad Leaf, 2 Brazils, 2 Canelles, 3 small Havanas, 1 Parfum d'Italie, 2 Tabacs Rouges, 1 Feuille d'Or, 1 Rosc de Perse, 1 Maryland, 5 Virginia x Herzegovina x Virginia, 2 Giant Herzegovinas, 4 Virginia x Herzegovina, 5 Herzegovina Stolak.

Among these varieties the Small Havana, Parfum d'Italie, Tabac Rouge, Feuille d'Or, Rose de Perse, Maryland, were grown at the Experimental Farm for the first time; the seed had been purchased from seedsmen. The germination in the beds was very poor, almost a failure in some cases. The growth on the field was normal, but the large number of strains observed in some varieties show conclusively that the seedsmen pay very little attention to the question of purity. On the other hand this seed, which is often of doubtful origin, is kept too long in the stores, sometimes under bad conditions, and it loses rapidly a part of its germinative power.

The price of the seed of some varieties is so high that it is reasonable to expect some guarantee from the seedsmen. Unfortunately, the lists published by the latter do not specify all the conditions of guarantee; these conditions are printed on the packages of seed and the farmer is aware of this only when he receives these packages,

which is always too late when the order is given by mail.

SOWING.

The sowing was done on a hotbed, two semi-hotbeds and the corner of a heated greenhouse. The hot and semi-hotbeds were made after the usual fashion, the first on a bed of fermenting horse manure, the second on a bed of tobacco stalks. One half of the hotbed and one half of the semi-hotbed received an application of chemical fertilizer 3-8-3 at the usual rate of 1 ounce per square foot, the other semi-hotbed and the other half of the hotbed did not receive any chemical fertilizer.

In the greenhouse the bed consisted of a layer of good vegetable earth, about five inches thick, placed on a stand of boards which had been perforated to insure good

drainage.

The hot and semi-hotbeds were seeded with dry seed on April 24 and 25, and the greenhouse bed on the 28th. In the beds, the seedlings made an appearance on the

29th of April; in the greenhouse, on the 6th of May.

A rather large quantity of efflorescence was seen on a part of the hotbed which had been treated with chemical fertilizers as well as on the semi-hotbed submitted to the same treatment. This disappeared rapidly when sprinkling was done. This accident, which was not very serious, might have been avoided if a thicker layer of vegetable earth had been used, one inch instead of half an inch.

The following notes were taken:-

 $\Lambda pril$ 29.—Large number of seeds germinated on the surface of the soil, under the glazed sashes.

Some efflorescence on the part of a hotbed which had been treated with chemical fertilizers and on the first semi-hotbed.

Water drips in the greenhouse, causing an excess of moisture and a marked cooling of the temperature.

Cloudy and rather cold weather. Temperature keeps about 60° F.

May 8.—The stand is good in the hotbed on the parts which have not received chemical fertilizers, thin on the parts which have been fertilized. On the first semi-hotbed, the stand is sufficiently fairly well distributed but the seedlings are slightly burnt on the parts where effloresence has appeared.

The second semi-hotbed is very good, the stand even. There is a lack of seedlings towards the lower part of the beds, which is damper and where the light is not so good.

In the greenhouse the seedlings are very late. Ventilation insufficient.

The seeds of the Tobacco Division have germinated well, the seeds supplied by the seedsmen have a very uneven germination; some have not germinated at all.

May 19.—The stand is good on all hotbeds where no chemical fertilizers have been used; there are a number of misses and the seedlings are later in the three beds where chemical fertilizers have been used than on the others.

In the semi-hotbed treated with chemical fertilizers the stand is fair; there are a number of misses. However, on the whole, the number of seedlings is sufficient. The untreated semi-hotbed is very good, not so far advanced, however, as the good parts of the hotbed. The Italian tobaccos are by far the earliest.

The greenhouse is very late. Some tradesmen's seeds have not germinated at all. The greater part of the seedlings under the sashes could, under good treatment, be utilized in eight or ten days.

May 29.—(Final comparison between the various beds.)

Between the first semi-horbed and the best part of the horbed, the advantage, considering the development of the seedlings, lies with the horbed. The vegetation on the semi-horbed has evidently suffered from the chemical fertilizer being left too close to the surface.

The second semi-hotbed is much better than the first one. Judging only by the growth of the seedlings, the good part of the hotbed has the advantage over the second semi-hotbed. Of the treated parts of the hotbed and the first semi-hotbed, also treated, the latter is by far superior. The combined effect of chemical fertilizer and of the heat of the hotbed seems to have had an injurious effect.

There is no comparison possible between sowing under glass and sowing in the greenhouse, as greenhouse seedlings are very late.

The following table contains a record of temperatures, maxima and minima, for the year 1914, as well as a record of outside temperatures.

TEMPERATURES of Tobacco Beds at the Experimental Farm, Season 1914.

*	Hot	bed.	Cold	d beds wi	thout ma	nure.		•		
		1		В	1	C		Green-		tside rature.
	Manu	ıre 8"		mical . lizer.		nemical lizer.		,		
1914.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
A'1 0=	0	٥	0	0	0	0	۰	. •		•
April 25. " 26. " 27. " 28. " 29. " 29. " 29. " 30. May 1. " 2. " 4. " 5. " 6. " 7. " 8. " 9. " 10. " 11. " 12. " 13. " 14. " 15. " 17. " 18. " 19. " 11. " 12. " 13. " 14. " 15. " 18. " 19. " 10. " 11. " 12. " 13. " 14. " 15. " 18. " 19. " 10. " 10. " 11. " 12. " 12. " 13. " 14. " 15. " 18. " 19. " 10. " 10. " 11. " 12. " 12. " 13. " 14. " 15. " 15. " 18. " 19. " 19. " 20. " 21. " 22. " 23. " 24. " 25. " 26. " 27.	80 69 78 92 58 90 75 85 76 83 76 83 85 80 78 82 85 82 85 82 83 84 83 84 90 90 92 92	55 64 72 50 50 55 55 58 63 63 59 62 56 57 57 55 57 55 54 59 61 62 66 70 63 58 70 63	76 64 82 90 62 90 82 82 82 84 80 85 78 80 85 78 87 87 89 89 89 89 89 89 89 89 89 89 89 89 89	54 63 71 50 52 50 54 47 61 57 60 62 52 55 60 46 51 50 60 60 60 60 60 60 60 60 60 60 60 60 60	83 91 60 90 82 72 83 80 83 86 76 77 77 77 77 77 77 77 77 77 77 77 77	68 50 50 52 50 54 54 54 54 60 53 50 51 57 50 44 46 50 48 50 48 50 50 51 50 50 50 50 50 50 50 50 50 50	81 81 81 60 82 75 80 95 87 94 86 85 86 85 89 85 85 82 85 85 82 85 86 85 87 89 87 88 88 88 88 88 88 88 88 88 88 88 88	60 51 43 42 47 54 57 58 54 47 50 42 47 50 42 47 50 50 44 51 52 53 54 45 47 50 50 47 50 50 47 50 50 50 50 50 50 50 50 50 50	44 85 80 75 85 90 77 86 80 68 67 70 70 70 67 72 85 89 89 89 89 89 93 95 70 70 70 70 80 80 80 80 80 80 80 80 80 80 80 80 80	38 28 28 34 43 47 40 45 46 35 30 35 31 39 48 58 58
n 28 n 29	100 98	66 50	99 98	65 48	102 100	62	, 85	58	80	57
11 30	90	. 60	92	60	91	49 61	91 90	54 48	80 85	48 47
" 31	91 93	60 59	91 94	58 55	92 94	58 54	87 87	53 63	91	47
11 2	80	50	80	52	85	46	87 75	63 40	90 73	48 38
3	76 82	49	76	51	76	52	74	53	73	48
5	87	59 50	83	55 49	84	54 49	75	53	72	47

To sum up: The best bed is the semi-hotbed with or without chemical fertilizers, according to the fertility of the vegetable earth that is used. As the vegetable earth used at the Experimental Farm is very rich the chemical fertilizers could have been dispensed with.

The efflorescence that appeared in the spring 1914 on the beds where the thickness of the vegetable earth for seedlings was not over half an inch had been avoided during previous years when one inch thick of vegetable matter had been used.

Complete details on these observations which have lasted several years will be found in bulletin 21, "Tobacco Seedlings," which is now ready for distribution.

TRANSPLANTING.

The work of transplanting was started on May 28, in exceptionally hot weather for the season. The growth of the seedlings on the beds was accelerated to such an extraordinary degree that it became necessary to pull them out before the day which had been appointed for transplanting. Unfortunately, this period of hot weather was accompanied by a long drought which made it very difficult to prepare the soil. For the first time since tobacco has been grown at the Experimental Farm, it was necessary to use water to insure the recovery of the seedlings.

It should be noted that on account of the comparatively small size of our experimental field and of the large number of varieties which are grown, machine planting, by which the seedlings are watered as they are put into ground, could not be used. Therefore the young plants had great difficulty in taking root and, on the other hand, the cutworms having done considerable injury, some parts of the field had to be replanted almost entirely several times. The situation was somewhat improved by a light rain on the 8th of June, but watering had to be continued on the other resettings.

The season of 1914 was unfavourable. The seedlings, suffering from the drought and the extreme heat of the end of May, did not take root very well. To make matters worse, the temperature was comparatively cool during the summer. There was only a short period of heat with the exception of the end of May and the beginning of June, when the hot weather gave us so much trouble at transplanting time.

Owing to the comparative coolness of the summer, our seeds ripened much later than in a normal year. However, the plants which had been topped were ready in good time, even a little earlier than usual for the seed leaves. Most of the latter were ready to be cut during the second fortnight of August, some as early as the 18th.

Among other varieties grown, some were not harvested until a comparatively late date in September, chiefly because it was desired to let the tobacco yellow up on the field before it was taken to the curing house. This was particularly the case for the Italian Virginias, Maryland, Feuille d'Or, etc., which were very ripe when harvested.

As in previous years, the seed plants were protected from the frost by being pulled out towards the middle of September and placed under a canvas covering during the night.

The following table shows the distances apart at which the varieties grown in 1913 were planted, the date of harvesting, the yields in weight, in raw tobacco per acre and per arpent. The yields are computed for a plantation without any misses. They are possible yields. It should be noted, however, that they are computed from rather weakly plants which, with very few exceptions, had not been considered good enough for the production of seeds.

		1	1	1	
Distances	Number of	Varieties grown.	Date of	Yield in	Weight.
apart. per acre			harvesting.	Per acre.	Per arpent.
Feet.				Lb.	Lb.
3 x 2½	` 5808	Big Ohio	Sept. 14	2349	1984
3 x 2	7260	Big Havana, No. 130 General Grant. Connecticut Seed Leaf. Broad Leaf. Virginia x Herzég. x Virg. No. 52	August 25 25 Sept. 14	2032 2970 2002 1452 1744 2074	1717 2509 1691 1226 1473 1752
		" " 55 57 57 54 54 54 54 54 54 54 54 54 55	13 13 13 14 14 18 19	1893 2292 1452 1954 - 1879 2209	15 ¹ 9 1936 1226 1651 1587 1866
	-	Virginia x Herzégovine, No. 35	11 13 11 14 11 4 11 13 11 13 11 4 11 4	2178 2904 1675 1452 1815 1053 1599 1428	1840 2153 1415 1226 1533 889 1351 1206
3 x 1½	9680	Big Ohio x Sumatra		1361	1150
2½ x 1½	11615	Belgian	17 11 17 11 19	1631 1802 1786	1378 1522
2½ x 1½		" " " 118 " " 103 " " 100 " " St. Jacques, 1999 " 1909 " 1909 " No. 119 " " 101 " Yamaska" " 101 " " 101 " " Las Almas Maryland, Golden Seal. Small Havana, Mir.	u 19	1786 1985 1633 1250 2217 2356 2009 1818 2165 1890 1567 1410 1441 2419 1896 1032 1161 1346 1548 2007	1509 1677 1379 1056 1873 1990 1697 1536 1829 1597 1324 1191 1217 2014 1602 872 872 1384 1137 1386 1486 1486 1486 1486 1486 1486 1486 14
2 x 1		Canelle P	n 18 n 18	1601 1281	1352 1082

Note.—For computing the yield per acre, the area of the arpent was figured at 0.845 acre.

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NOTES ON THE VARIETIES.

As a whole, the yields in weight are much higher than the yields obtained in 1913. It will not be necessary to repeat what has been said in last year's report about the varieties Big Ohio, Big Havana, General Grant, Connecticut Seed Leaf or Broad Leaf. These varieties give good results on light soils, well manured and well drained, where no very early frosts are to be feared. Of course, the Connecticut was harvested at an exceptionally early date in 1914; in a normal year, this variety could hardly be harvested before the beginning of September. Of the two Connecticuts tried in 1914, the Connecticut Broad Leaf seems to be a little earlier; both were cut on the same day, the 25th of August, but the latter was much more advanced in ripening.

Belgian Tobacco.—This tobacco, of an indefinite variety, probably a degenerated Obourg type, gives a good yield in weight and ripens fairly early. It is almost as early as the Comstock. It could be recommended to the growers not having suitable soil for the production of thin tobacco—Comstock—and who, living in a locality where early frosts are expected, cannot grow the Connecticuts.

It is a pipe tobacco of average strength which is fairly well liked in Canada.

The seed used in 1914 gave numerous strains, from the large leaf of the Connecticut Broad Leaf to the long and curled leaf of some Kentuckys, as the One Sucker. The most interesting types were selected and will be grown in 1915 for the production of seed.

Comstock Spanish.—The Comstock Spanish is by far the earliest of all our industrial tobaccos. It is one, which, apparently, may be depended on in all seasons. The yields in weight were good. The variations in yield were a little more marked than might have been expected, however; those noted on this table are more the result of the differences in the nature of the soil of our experimental field than of the characters which it was endeavoured to fix during the previous selections. In all cases, the lots originating from seed selected during the previous year showed the greatest uniformity in the shape, the colour and the texture of the leaves, the earliness and the vigour of the plants. It shows that this work of selection may be continued with good results and that by taking averages even on those test plots, which differ so much in composition, the strains originally selected may be distinguished with sufficient accuracy and their relative value may be ascertained definitely.

Brazilians.—Brazilians have done little better than in 1913. However the products of this variety can only be used as fillers. They are thick, without much elasticity and have not a very pleasant taste. Although the seeds we had came from two of the best species, Las Almas and San Felix, the results obtained are not very satisfactory.

Big Ohio x Sumatra-Yamaska.—These hybrids are almost fixed, and it is probable that they may be handed to some farmers in 1916. The Yamaska has retained all the earliness of the Comstock, the leaf is a little smaller, a little more rounded in shape, the ribs are finer, a little more elastic. It is expected that the products may be used for binders and perhaps they may sell for a higher price than the price which has been paid so far for Comstock Spanish.

The Big Ohio x Sumatra has not been quite so early, however, it was cut before the end of August. The yield in weight of the latter strain is not much greater than that of the Yamaska, although the plant looks far bigger. In this case also, one must consider the nature of the part of the experimental field where this tobacco was grown.

An endeavour is made to establish a strain of Big Ohio x Sumatra with a leaf of average length, of good width (about 3 to 5), elastic and of light green colour. Up to the present, the proportion of leaves with a dry point has been too large; at the base these leaves show the characteristics of the Sumatra and at the point, the characteristics of the Big Ohio, much too marked.

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Maryland.—This variety gives a most striking instance of the risk that one takes in purchasing seed from the seedsmen. The good faith of the seedsmen is not in doubt, as it is quite probable that the original seed was true, but it was a great mixture. It had all the colours of the rainbow, from the light yellow to the dark green.

A selection was made of the best plants, as far as shape and colour are concerned; the object being to secure early tobacco, of a light colour. Some good plants were

selected.

Since that time a better seed was received from some of the best districts and through reliable agents. It will thus be possible to make the necessary comparison.

The Marylands, although not quite so early as the Connecticuts, can be grown in Canada. They were harvested on the 14th of September but it is probable that in the neighbourhood of Ottawa and in the district west of Ottawa, it is almost as safe to grow them as the great Seed Leafs. They yield a little more than the latter and if light coloured leaves can be obtained, as required by the market, they may sell at a higher price than the latter.

Feuille d'Or-(Probably Gold Seal).-Many requests for seed of this variety had been received. It is a tall plant with large lanceolated leaves fairly close to the stem. It is medium in yield and earliness. It cures fairly easily, although the stem is rather big, and gives a light red leaf, a little darker than the best Maryland strains and with a looser texture. If the Maryland can be used for cigarette tobacco, the Feuille d'Or, such as we have harvested, would be suitable only for the manufacture of pipe tobacco or perhaps for plug wrappers.

Small Havanas-Red Tobaccos.-Seed from five different places was tried. Four times that number should have been tried in order to get an idea of what is understood in Canada under those rather loose titles, but there was not sufficient space.

Two of these seeds marked "Tabac Rouge" and "Petit Havane" have almost surely the same origin: tall plant, pronounced Cuban type, green leaf, with a Cuban shape but thick and lacking in elasticity. The name "little Havana" is hardly justified for a plant which is six feet and over; it is not a "tabac rouge" either. If the leaf had been a little finer and more elastic, it might have been used as cigar fillers. A selection was made with that object in view. The yield in weight is satisfactory, the carliness is sufficient and the leaves cure without difficulty.

Only one lot of the seeds grown under the name of little Havana gave a really uniform product. Small plant with a smaller number of leaves, well spaced on the stem, with an oval, rounded shape, a little larger than the Canelle. Early maturity, rapid curing. The leaf easily takes a special red brick colour when well advanced in

ripening.

None of the Tabacs Rouges treated in 1914 gave a purple or red flower. In one of the cases, it was only an accidental cross of Comstock Spanish and Little Havana.

perhaps also of Cuban.

Too much time has perhaps been spent on the description of these varieties. However, it is felt that the attention of Canadian growers should be called to the fact that it is absolutely necessary to keep up the purity of the strains that have made the reputation of some centres of the province of Quebec. These strains are the Canelle, Small Havana, Tabac Rouge, Petit Canadien, etc.

As to the Canelle, it is believed that seed of pure Canelle or almost pure Canelle can still be secured, although some tobacco dealers complain of the difficulty that they have to find Canelle as good as those of the old time. As to the other varieties, only one result about satisfactory has been obtained so far. In most cases they are hybrids of indifferent quality, without any uniformity, varying from the Havana Seed Leaf or Comstock Spanish, as the case may be, to the Cuban more or less pure, all products of chance crosses.

Virginia x Herzegovina, Herzegovina Stolak, etc.—It was specially desired to note the result of individual selections made in 1913, and to secure seed. Owing to the uniformity of the various lots originating from the seed harvested in 1913, it was decided to grow, in 1915, on a more extensive area, two selections of Virginia x Herzegovina which would thus be submitted to a practical growing and curing test.

FERMENTATION AT THE WAREHOUSE.

The tobaccos from the 1913 crop on the stations of St. Jacques l'Achigan and Farnham were fermented in 1913-14 by the system of bulk fermentation.

The first fermentation was well carried out, but at the second mould was observed, the proportion of humidity in the rooms had to be reduced and the blankets had to be taken off from the bulks of tobacco.

This removal of the blankets was apparently sufficient to prevent the condensation of humidity which produces, near the edges of the bulks, a favourable zone for the growth of mould. While the moulds were destroyed in the centre of the heaps by the temperature of the latter, they could no longer find, along the edges of the heaps, the favourable conditions for their growth.

By courtesy of the Dominion Botanist, Mr. H. T. Güssow, a study of the moulds of tobacco was started on the spot by one of his assistants. Unfortunately, however, this work came to an end when this assistant rejoined the French Army.

Betuning.—An experiment on betuning started in the summer of 1914 gave fairly good results. In spite of the rather high proportion of humidity to which they were submitted before being bulked up to be fermented again, the leaves came out of the bulks perfectly sound, markedly improved and with a strictly ammoniacal odour. They were packed in the middle of the summer. However, the temperature did not rise enough to provoke a new fermentation in the final packages.

Grading.—The tobaccos from the 1914 crop were-packed at Farnham. A preliminary grading was done on the farm when the leaves were being stemmed. Three classes were made; top, median and bottom leaves and trash. However, on account of the damage caused by the hail on August 19, too many broken leaves were included with the bottom leaves and the value of the latter was reduced in proportion. Owing to this fact, there was no final grading, as the cost of this work would have been out of all proportion with the real value of the products.

The warehouse of Mr. J. M. Fortier, Limited, was placed at our disposal and the grading and packing were done under the direction of the foreman of the St. Césaire Co-Operative Society. Our tobacco therefore was prepared in much the same manner as the products of the St. Césaire district have been prepared for the Canadian market during the last few years.

Abundant help being available, this work was concluded in about a week. At the Central Experimental Farm, owing to the lack of space and of expert help, it would have required at least two months. The workmen were paid by the job and the expenditure was only half of what it would have been otherwise.

This tobacco, packed in boxes, was shipped to Ottawa in the middle of January. It was slightly fermented in our warehouse, at a temperature of 70 to 75 degrees, in an atmosphere which contained about 70 per cent of moisture (to prevent the appearance of mould).

The fires were extinguished at about the end of March and the tobacco was left at the temperature of the rooms. Since then the moisture averaged about 80 to 85 per cent. The observations made while the tobacco of 1914 was being graded are given in the report of the Manager of Farnham Station. It was desired to compare these results with the results of the 1913 crop, but owing to the number of injuries caused by hail, this comparison is impossible.

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DISTRIBUTION OF SEED.

This year, as usual a large number of requests for samples of seed were received by the Tobacco Division but some of these could not be complied with owing to the rapid exhaustion of our stocks,

The number of samples distributed was as follows:—

Canelle	1,387	Tabac Rouge 56
Comstock Spanish		Blue Pryor 38
Connecticut Seed Leaf		Warne
Connecticut Broad Leaf		Belge 2
General Grant	307	Big Ohio 5
Big Havana		Big Ohio x Sumatra 1
Petit Havane		Aurora
White Burley		Verel
Cubain	57	Comstock x Sumatra 1

A marked increase was noted in the number of demands for General Grant, Connecticut Seed Leaf, Connecticut Broad Leaf and Big Havana. These demands came specially from the districts along the north shore of the St. Lawrence, where pipe tobacco is gradually taking the place of Comstocks.

It is hoped that the comparatively early varieties of large tobacco which have been introduced at the Experimental Farm during the last few years will maintain their earliness in the colder districts where they were distributed and will escape the first autumn frosts which are the most serious obstacle to their establishment in those parts of Canada.

PLATE XCVI

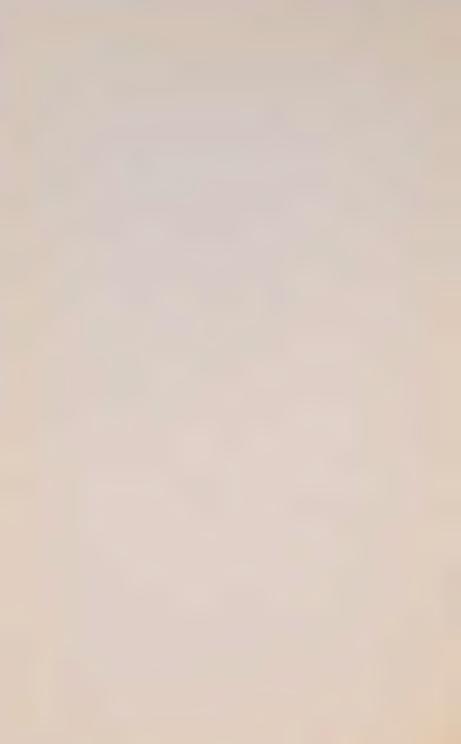


The Charcoal Heater. The best and cheapest means of combating excess of moisture in the curing-shed.





Special Wagon for hauling the Tolacco to the Curing-shed. A strong horse can draw 75 loaded laths (about 500 plants).



EXPERIMENTAL TOBACCO STATION, FARNHAM, QUE.

REPORT OF THE MANAGER, O. CHEVALIER, I.N.A.

It may be said that the Experimental Station of Farnham is farmed after an intensive method of cropping, the main crop being tobacco. A three-years' rotation is followed with tobacco as a leader; this rotation had been definitely adopted after five years of observations and practical experiments. It will be remembered that this place was at first in a very poor condition, owing to an unscientific and careless method of cultivation. Therefore it was necessary, apart from the growing of tobacco and other crops such as oats and clover, to renovate and repair the farm (drainage, buildings, leveling, ditches, clearing, etc.) In short the work of improvement kept us very busy. The first part of this report deals with the farm proper and the second with the improvements made.

THE FARM PROPER.

Tobacco being our main crop, it will have first place in this report.

Varieties .- In 1914 the following varieties were experimented with:-

1. Big Ohio x Sumatra (with a view to continue the selection of the strain originated by us five years ago).

2. Yamaska (same object as for preceding variety).

- 3. Havana Seed Leaf.
- 4. Comstock Spanish.
- 5. Cuban.
- 6. San Felix.
- 7. Las Almas.

The latter two are Brazilian varieties which it was desired to test for the second time, to ascertain if they would be suitable for the production of fillers.

There were also other varieties of more or less fixed type, generally pipe tobaccos, the advantages of which it was proposed to ascertain. These varieties are the following:—

Big Havana.
Obourg.
Tabac Rouge.
Big Ohio.
Small Havana
Small Havana (Mir.),

Feuille d'Or. Connecticut Seed Leaf. Maryland. Small Havana (Bl.). Persian Rose. Sumatra.

The seeds of the latter varieties had been supplied by seedsmen or by some obliging farmers. The seed beds of the Persian Rose and of the Feuille d'Or were a complete failure. There were practically no seedlings. As to the rest, the crop was entirely destroyed by the frost of the 8th of October.

This frost caused a further delay of one year, as several good hybrids had been grown with success.

First, the hybrid Big Ohio x Sumatra, in which each one of these two varieties had been used, once as a male, once as a female. It was desired to reconstitute this hybrid. Out of 48 hybrid flowers, 42 heads formed and were making good progress towards ripening. The same had been done with the Comstock and Sumatra, but only

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18 heads had formed out of 30 hybrids. The hybrids of the Connecticut Seed Leaf and of the Cuban had been a complete success; 37 heads were obtained on the 37 flowers artificially fertilized.

For two successive years the crop of our seed plants was destroyed by frost. As a prevention, it was decided to build on the farm a sort of greenhouse in which the seed plants would be taken and where they would be sheltered from the frost and could thus ripen without injury.

BEDS.

The coldbeds were used. The frames were placed in a well situated part of the farm, well drained, fairly high, and well sheltered on one side by the big curing barn and on the other side by a board fence, six feet high. The soil used came from a young clover meadow and it was disinfected by formalin before it was put into the frames. Half the beds received an application of chemical fertilizers, according to the usual method, and the other half did not. No difference was observed between the two lots of beds, treated and untreated, when the seedlings were growing. When ready, the frames were exposed to the sun during four days, when the surface was lightly raked and sowing was done as follows:—

April 22: Comstock Spanish, Havana Seed Leaf, Big Ohio x Sumatra, Yamaska. (Nine beds and a half.)

April 23: Las Almas, San Felix, Cuban, and other varieties previously mentioned. (Ten beds and a half.) A total of twenty beds of 15 by 5 feet, or a total area sown of 1,500 square feet. All the seed was sown at the rate of one-seventh of an ounce per hundred square feet of bed.

White canvas was laid on the sashes to prevent sunburn and nocturnal radiation. At the beginning, the beds were watered about noon with lukewarm water (25° centigrade). Later they were watered twice a day according to the condition of the seedlings. The day after the sowing was done, the beds were ventilated more or less according to the out-ide temperature. The temperature of the beds and the out-ide temperature were fairly closely recorded. Further on in this report, diagrams will be found showing a record of maxima and minima temperatures in the beds and out-side.

On May 6, the varieties Las Almas, San Felix, Big Ohio, and Havana Seed Leaf appeared above the surface. Some seedlings of the Yamaska also showed up. On the 8th the germination was general, with the exception of the Cuban, Persian Rose and Feuille d'Or. The latter two varieties did not germinate at all; as to the Cuban, the germination was very weak; only a few hundred plants were obtained. The seed of the Persian Rose and Feuille d'Or came from seedsmen and those of the Cuban came from Cuba; they must have been very old as their germinative power was very poor.

NOTES ON THE TEMPERATURES.

As may be observed from the attached diagram, the outside temperature kept rather low during the growth of the seedlings; however, the minimum in the beds was always above the minimum outside. During the night of the 25th to the 26th of April, the minimum outside was 18 degrees F., and it was only after the 3rd of May that the outside minimum remained above frost; to that date the lowest temperatures recorded in the beds were 33 degrees F. on the 25th of April and 35 degrees F. on the 2nd of May. In spite of the marked irregularity in the diagram of outside temperature, it will be seen that the maintenance of a fairly regular maximum temperature in the beds, between 80 and 85 degrees F., offers no great difficulty; it is a question of knowing how to handle the sashes.

FARNHAM.

On June 6th, seedlings were ready for transplanting. There was a plentiful supply of healthy seedlings and well provided with roots. The seedlings of the Brazilian varieties were a little spindly, but in no case were diseases observed. The beds attracted the attention of a number of visitors as, generally speaking, the sowing of tobacco met with poor success in the district, especially the sowing done on hotbeds.

Having an abundance of seedlings, we were able to distribute some 52,000 of them

to the less fortunate growers,

TRANSPLANTING.

Preparation of the soil.—The field on which seedlings were planted covers an area of twelve acres. It was drained last fall, well manured with farm manure (18 tons to the acre) and this manure was ploughed under with a rather deep ploughing before the winter of 1913-14.

The preparation of the soil was started on May 26. It consisted of the following: two diskings with the double disk in both directions, four harrowings with the spring

harrow; five strokes of the smoothing harrow.

The object of this cultivation was to rid the soil of the couch grass with which it was infested. It was successful to a certain extent and all the couch grass was burnt on the spot. The land being drained, it might have been prepared much earlier. However, we were busy sowing at that time on another part of the farm.

As soon as the land was ready, chemical fertilizers were applied. A field of two acres was set apart for a special test which is reported further on. The rest of the field was treated with a mixture composed of the following per acre:—250 pounds sulphate of ammonia, 150 pounds sulphate of potassium, 100 pounds superphosphate.

Transplanting.—The work of transplanting was started on June 8 with the Big Ohio x Sumatra. The following varieties were planted:—2 arpents of Big Ohio x Sumatra, 2 arpents of Comstock Spanish, 1 arpent of Las Almas, 1 arpent of San Felix, 2 arpents of Yamaska, 2 arpents of Havana Seed Leaf.

This work was extremely difficult owing to the extreme drought and the strong west winds which lasted twenty-seven days. In order to gain time, two machines had

to be used.

The drought and the insects (cutworms and wireworms) caused tremendous injury. Although poison had been spread on the field and although a large quantity of water had been used in planting, the crop had to be harrowed up and replanted. Some varieties, and particularly the Yamaska and San Felix, were planted three times. As may be imagined, the recovery was very difficult and the misses very numerous; this is why the area in tobacco is not as large as was provided for in our programme.

To avoid a complete destruction of our crop it had to be watered,—slow, painful and very expensive work. A fire hose was kindly lent us by the town of Farnham and we were authorized to take water from a hydrant. The water was taken to the field in molasses tuns and spread with hand sprinklers, by a crew of eighteen men. This work having to be repeated owing to the persistence of the drought, an endeavour was made then to make it as cheap as possible. A tun, perforated at the bottom, was fitted with a cork two inches in diameter; three inches from the cork a sloping board was put against which the water was thrown. The whole thing was carried in a cart, the wheels of which had to be set closer so as to be able to pass through the crop. This rather primitive system was extremely useful; the crop was watered liberally several times, water being thrown on two rows of tobacco at the same time. In this way it is possible to water one acre in a day with an intermission of four hours from 11 a.m. to 3 p.m., to avoid burning the plants. This system of watering was continued till June 20 on which date a good rain created almost favourable conditions.

During all this time a continual war had to be waged against insects. Paris green

was used in various ways.

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- 1. In the water of the planting machine at a rate of one ounce, one and a half ounce and two ounces, dissolved in a little acetic acid very diluted.
 - 2. Usual application with flour, 1 per cent.
- 3. Ordinary mixture with a little molasses (molasses dissolved in a little water then mixed with the usual combination).
 - 4. Usual mixture with Paris Green and pyrethrum powder, equal parts.

Each different mixture was tried on four rows, each of which contained 285 seedlings.

The damages caused by insects were practically the same in all cases, with the possible exception of mixture No. 4, but the results were by no means conclusively in favour of this mixture. A good way to destroy the cutworm is to hunt them at night with a good lantern; a considerable quantity may be picked up in a few hours.

Lead Arsenate.—Lead arsenate was also used to destroy insects. It gives perhaps better results than copper arsenate, owing to the fact that it does not dissolve readily in water and it adheres very strongly; it has a far more lasting effect. The difference in price is insignificent and 0.50 per cent lead arsenate gives at least as good results as 1 per cent Paris green.

The small experimental varieties: Grand Canadien, Comstock 104, 106, 108 were planted on June 18. This crop includes a total of 1,238 plants; it was hand-planted on a field situated along the river front. The little Cuban we had was planted in the ravine as it was desired to ascertain the fertility of this part of the farm, on which a good deal of filling-in had been done. This is reported on further on.

After the 18th of July we had a period of great heat which, coming after a few days of rain during the previous week, did much good to the crop. It may even be stated that the situation was saved by this welcome heat. Unfortunately, three weeks had been lost. The end of July and the month of August were very favourable and the crop had become almost normal in appearance. Then a violent hailstorm practically destroyed all the crops in the Yamaska valley and twenty-five per cent of our crop (August 19).

The details of the work necessary for the cultivation of our tobacco field is given. in the following table:—

Varieties.	Area.	Hoeing,	Topping.	Suckering,	Harvest.
Big Ohio	_	Hoe and 3 with the	28 29 July	10-11 A ug	
Yamaska Havana Seed Leaf Las Almas St. Félix	1 "		1 Aug	15, 17, 20 Aug 15, 17 Aug. & 1 Sept.	29-31 " 2 Sept. 4 "

SELECTION.

This year, as in the past, the work of selection was done with special care.

Two types were selected in the Big Ohio x Sumatra: (1) Round leaf type and

(2) Elongated leaf type.

The first of these types promises to give an elastic leaf rather fine, of good diametral ratio, (3-5); the second, a longer leaf, with a longer point, a fine texture, not quite so elastic; it may be used for light pipe tobacco.

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The selection in the Comstock variety was done with a view to secure an increase in yield by a larger size of the leaf or by the closer setting of the leaves on the stem and therefore a larger number of leaves. This feature was the one on which most stress was laid with a view to maintain the "binders" characteristics; fine elastic leaf, with a round oval shape and an average development.

All our selected seed plants have suffered more or less from the frost. However, owing to their rather limited number, it was possible to protect them by means of artificial shelters composed of bags held in place by laths. Only a few heads were completely destroyed, the others remained normal and a germination test gave very satisfactory results.

HARVESTING.

Instead of taking the tobacco directly to the curing barn as was done in the past. it was submitted, this year, to a rather long wilting on the field, which, in some cases, lasted five days. The following method was adopted: stands composed of cross-pieces from 3 to 4 inches thick and braced by posts of the same size supported at the bottom by braces, were built in the field. The laths loaded with tobacco were placed on these stands in the same position that they occupy in the curing house, but a little closer, the leaves being in contact with each other. When necessary, white damp-proof canvas was used to shelter the tobacco from the rain, from the strong wind, from the dew, the dampness of the night. In two or three days the tobacco becomes much more elastic and changes colour. By this method, from ten to fifteen days may be gained on the time spent in the curing barn. This long period of wilting in the field has important advantages; in the first place a large quantity of tobacco may be cut every day, without running the risk of leaving some of the tobacco until the next day on the field; then, the tobacco being very elastic, is much more easily taken to the curing house. Lastly, it may be stripped much earlier; this year the stripping was completed long before other growers had stripped theirs.

As stated in our report for 1913-14, the rack used for the hauling of tobacco has been modified and this modification has given very good results. The frame loaded with laths can be easily removed, without injuring the leaves in any way. The accompanying plate will give a better idea of this improvement than any description that could be made.—

CURING.

On the 7th of September the whole of our crop was in the curing-barn and all the leaves had the yellow tinge which indicates the first phase of curing. Dry weather prevailed during most of September and the conditions were very favourable to the curing. Unfortunately October was rather cold and wet. Mould appeared on some leaves and artificial means of curing had to be used. The system which was used gave us excellent results and can be strongly recommended to the growers. This system is as follows: sheet iron heaters are placed at twenty foot intervals in the curing-house and charcoal fires are made. These heaters, which measure 18 by 12 inches in diameter, are fitted at the lower part with a rather close grate, supported on two pieces of iron, one inch wide and turned in a half circle. The heater is lighted outside and then taken into the curing-house. When in place, the heater is covered with a conical-shaped cover, also of sheet iron, which prevents the emission of sparks. With one day's fire, even in damp weather, the tobacco may acquire an almost brittle texture. Of course, when the curing-barn is heated, all lateral openings should be closed.

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STRIPPING.

Our crop could have been stripped early in November. Unfortunately, the weather remained very dry and we had to wait for rain as late as the 18th and 19th of November; it was only at that time that the tobacco became sufficiently supple to be safely taken down. This rainy period was of short duration and as the return of drought was anticipated, a large quantity of tobacco was taken down at one time, so as to keep our men busy at stripping. When stripping, the leaves that were very much injured by hail were put aside, the rest was graded in three classes, bottom leaves, median leaves and top leaves and the whole was put in bales of 40 to 50 pounds, slightly compressed.

YIELDS AND QUALITY OF THE PRODUCTS.

As soon as the stripping was over, that is on the 15th of December, our crop was taken to J. M. Fortier and Co.'s warehouse and at once put under treatment.

After checking the weight of the bales, the leaves of the same character were put . in heaps of two and three thousand pounds. The top leaves were put in the bottom. layers, then the bottom leaves, and the median leaves on top. The bottom leaves should always be put in the centre of the heap, as they have much less body than the other leaves and are often very slow in fermenting. The heaps were made in special fermenting rooms and covered with thick woollen blankets. On the morning of the 21st, the temperature of the four heaps was, respectively, 31° C., 32° C., 24° C., and 33° C. They were taken down and grading was started at once. Sixty-five men took part in this work. A number of men were grading according to the tissue "binders No. 1." "Linders No. 2," "yellow tobacco" and "trash." Another group was grading into lengths, 12, 14, 16, 18, 20, 22, 24, 26 inches, and putting the tobacco into hands that were packed into boxes as they were ready. On account of the injuries caused by hail, a rather large quantity of tobacco was not graded at all; it was simply put into hands and packed into pressed bales weighing from 50 to 60 pounds each. The yellow tobaccos went through the same process of grading but were sold without being fermented.

During the short fermentation to which the tobaccos were submitted before grading, the rooms were kept at a very hot and a very damp temperature. The dampness was caused by steam freely admitted in the rooms during ten minutes every hour.

Big Ohio x Sumatra.—This variety gave us a total yield of 1,982 pounds for two arpents, which is at the rate of 991 pounds per arpent. These 1,982 pounds included: 1,012 pounds of median leaves, 262 pounds of bottom leaves, 427 pounds of top leaves, 259 pounds of refuse, 22 pounds of leaves harvested on seed plants.

Of this total, 510 pounds were packed in boxes, including 173 pounds of binders

No. 1, and 337 pounds of binders No. 2.

The Big Ohio x Sumatra requires further selection but it will certainly fulfil our expectations. On account of the hail, 943 pounds were simply packed in bales as they could not be used either as binders or as fillers. In an average year, a crop should give at least sixty per cent of binders, including forty per cent of binders No. 1. The tissue is closer than it was before and the shape of the leaf more profitable. No leaves in this crop were under 18 inches long and the greater proportion were 22 inches long, that is 328 pounds out of 510 graded; there were 166 pounds of 20-inch leaves.

Comstock.—Two arpents of this variety gave a total yield of 2,098 pounds, as follows: 851 pounds of median leaves, 262 pounds of bottom leaves, 600 pounds of top leaves, and 385 pounds of refuse.

Out of 965 pounds graded, there were 561 pounds of binders No. 1 and 404 pounds of binders No. 2. This variety had not suffered so much from the hail as the Big Ohio

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x Sumatra. The quantity of Comstock put into bales was only 442 pounds, out of a total yield of 2,098 pounds, instead of 943 pounds of Big Ohio x Sumatra out of a total yield of 1,982 pounds. These figures show that the yields of these two varieties are practically the same; the Comstock gave 398 pounds of leaves 22 inches long and 334 pounds of leaves 24 inches long.

Havana Seed Leaf.—Two arpents of Havana Seed Leaf gave 1,527 pounds, which were graded as follows, while stripped: 285 pounds of top leaves, 693 pounds of median

leaves, 349 pounds of bottom leaves, 200 pounds of refuse.

The final grading gave 369 pounds of binders No. 1 and 381 pounds of binders No. 2, a total of 750 pounds that were packed into boxes. The yield of the Havana Seed Leaf is not nearly as large as in previous years. This part of our crop suffered greatly from drought. The planting was finished comparatively late as the crop had to be replanted several times. Nevertheless, the products obtained are good, the shape of the leaf is good and the quality of the tissue is excellent. The length of the leaves varies from 14 to 24 inches; there are 250 pounds of 22-inch leaves, 187 pounds of 20-inch leaves, 19 pounds only of 14-inch leaves and 111 pounds of 24-inch leaves.

Yamaska.—An arpent of this tobacco gave us a total crop of 800 pounds, including: 427 pounds of median leaves, 55 pounds of bottom leaves, 218 pounds of top

leaves, 100 pounds of refuse.

As will be noted, there is a very high proportion of median leaves and a low proportion of bottom leaves. This crop gave 134 pounds of binders No. 1 and 314 pounds of binders No. 2: Only 448 pounds were graded, the rest, 309 pounds, chiefly made up of bottom leaves and of leaves injured by the hail, was pressed into bales. The 20 inch leaves formed the greater proportion of the total, 143 pounds, then came the 18 inch leaves, 136 pounds; 14 inch leaves, 10 pounds and 24 inch leaves, 14 pounds.

After the Comstock Spanish, the tissue of best quality is found in the Yamaska. This is a promising tobacco and we should not be surprised to see it considered one

day as the standard for binders tobacco in our country.

Las Almas.—This is a Brazilian tobacco which is exclusively used for fillers.

The yield in weight is rather low, it seems to be slow in getting acclimatized. An arpent gave 559 pounds, including 184 pounds of top leaves, 260 pounds of median leaves, 115 pounds of refuse.

All the bottom leaves were of such a texture and of such a size that they were graded with the median leaves. The results of the grading were as follows: 391 pounds of good fillers, including 162 pounds of 16 inch leaves and 138 pounds of 18 inch leaves.

San F-lix.—Another Brazilian variety which is still less productive than the Las Almas.

The total crop was 425 pounds, including 11 pounds of refuse when stemming: 125 pounds of top leaves, 167 pounds of median leaves, 21 pounds of bottom leaves.

The 305 pounds that were accepted at grading included 133 pounds of 16 inch leaves and 89 pounds of 18 inch leaves.

NUMBER OF LEAVES PER POUND.

In order to make a comparison between the various varieties grown on our station, the number of leaves per pound has been ascertained. The following figures represent an average of three experiments in which different weights were used.

The crop of St. Jacques l'Achigan being handled at Farnham at the same time as ours, it was possible to compare the products of the northern counties with those of the south shore of the St. Lawrence.

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(a) Big Ohio x Sumatra (Farnham)—
18 inches, 76 leaves to the pound.
20 "62"
22 "48"
24 "41"
26 "35"
Big Ohio x Sumatra (St. Jacques l'Achigan)—
18 inches, 70 leaves to the pound.
20 "59"
22 "42"
24 "31"
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It may be concluded from these figures that, for this variety at least, the leaves obtained at Farnham are much thinner than those obtained in the north shore counties.

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(b) Comstock (St. Jacques l'Achigan)-
        16 inches, 80 leaves to the pound,
        18
                  74
        20
             66
                              64
        24
                  60
   Comstock (Farnham)-
       16 inches, 77 leaves to the pound.
                  60
        20
             66
                   46
        24
```

The results of this comparison between the two Comstocks may seem strange, as it has been repeatedly shown that the binders grown in the Yamaska district are much thinner than those of Montcalm, Joliette, etc. The explanation in this case is as follows: the St. Jacques Comsteck is distinctly lighter than the Farnham Comstock, but it should be noticed that the first has a dry, almost lifeless texture; to use a technical term, it has no body. Furthermore, out of the 961 pounds of Comstock coming from St. Jacques, 280 pounds of yellow tobacco were eliminated; this yellow tobacco is practically dead tobacco, good for cigarettes, but absolutely useless for fermenting purposes. There was no yellow tobacco in the Farnham crop.

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(c) Yamaska (Farnham)—

16 inches, 79 leaves to the pound.

18 " 63 "
20 " 57

Yamaska (St. Jacques l'Achigan)—

16 inches, 77 leaves to the pound.

18 " 58 "

20 " 50 "

22 " 42 "

24 " 36 "
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These figures show very plainly that the St. Jacques Yamaska is, as usual, thicker than the same variety grown at Farnham. There is also to be noted in this case, as in the case of the Comstock, that the thin leaves in the St. Jacques crop have not so good a texture as the thin leaves of Farnham. As a matter of fact, some 60 pounds of yellow tobacco had to be taken out of the crop of Yamaska of St. Jacques.

As may be noted in the following table, among all the binder varieties grown, the Havana Seed Leaf is the thickest.

(d) Havana Seed Leaf-

FLUE CURING.

A special kiln for artificial curing of tobacco by means of hot air was built on the Farnham experimental station. This experiment had a two-fold object: (1) To open a market for this tobacco in the province of Quebec; (2) To use the cigar tobaccos more or less injured by the hail which falls rather frequently in the Yamaska valley. In this kiln, which measures 19 x 20 feet, the product of two acres of Comstock Spanish purchased from a farmer of the neighbourhood was treated in two lots. The results of this experiment were not very satisfactory. However, they showed that varieties suitable for this method of curing could give valuable products in our province, at least so far as the colour is concerned.

The results of the first lot cured were not quite so good as those of the second. It was our first experiment. The curing-house was over-filled and it is likely that the tobaccos had not been sufficiently wilted on the field.

As a matter of fact this crop had been harvested in the midst of a rainy season, on account of which it was not able to reach a proper degree of maturity.

As soon as it was sufficiently supple, this flue-cured tobacco was stripped. It was graded in two colours. The result of this grading is as follows:—

First lot.—Dark coloured tobacco, 904 pounds; light coloured tobacco, 287 pounds.

Second lot.—Dark coloured tobacco, 271 pounds; light coloured tobacco, 215 pounds.

As may be seen, the proportion of light tobacco is much larger in the second lot than in the first one. With the first lot, the curing-house had been overfilled, the laths were placed too close, the ventilation was poor, the condensation active and some fermentation occurred when the tobaccos were on the laths. The total amount flue-cured was 1.677 pounds harvested on two arpents, or 838-5 pounds per arpent. The average yield of the Comstock being estimated at 1.200 pounds per arpent, this flue-curing caused therefore a loss of 380 pounds, which is at the rate of 30 per cent.

This loss is, of course, much too high and much over the decrease in weight resulting from the evaporation of water or the loss of solid matter caused by such treatment. It shows that this crop, which had to be harvested before being sufficiently ripe, on account of the frost, was not in good enough condition to be submitted to this process.

EXPERIMENT WITH CHEMICAL FERTILIZERS.

This experiment was carried on on a field of two arpents which had been planted on the same day with Big Ohio x Sumatra. The object was to ascertain, as definitely as possible, the formula of sulphate of ammonia, sulphate of potash and superphosphate which gives the best results, under certain conditions of soil and climate. These two arpents were divided into sixteen equal plots and the following quantities of fertilizers were applied per arpent:—

Number.	Sulphate of ammonia.	Sulphate of potash.	Super- phosphate
	Lb.	Lb.	Lb.
	150	150	. 100
2	200	150	100
8	250	150	100
1	300	150	100
0	250	. 90	100
3.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	250	120	100
7	250	150	100
	250	180	100
	250	150	60
)	250	150	80
	250	150	100
2	250	150	120
3,	150	90	60
1	200	120	80
)	250	150	100
)	300	180	120

Apart from these chemical fertilizers, the sixteen plots also received barnyard manure at the rate of 16 tons per arpent. This manure was ploughed under in the fall of 1913 by a rather deep ploughing. The preparation of the soil in the spring was identical for the sixteen plots. In short, an endeavour was made to obtain conditions as nearly similar as possible.

A departure was made from the formula that had been used for a rather long time viz.: 250 pounds sulphate of ammonia, 150 pounds sulphate of potash and 100 pounds superphosphate to the arpent; the various mixtures employed were made up of varying proportions of the same elements. A glance at the accompanying table will show that there are, as a matter of fact, four distinct experiments. For instance, in plots No. 1, 2, 3 and 4 the quantity of sulphate of ammonia alone varies; this is a test of nitrogen. In plots 5, 6, 7 and 8, it is a test of potash as the quantities of sulphate of ammonia and of superphosphate do not vary. An experiment with phosphoric acid was made on plots 9, 10, 11 and 12. Lastly, the original formula was changed in an experiment on plots 13, 14, 15 and 16.

As it was desired to compare the results as soon as possible, it was decided to compute the yield instead of taking the total. When the crop was being stripped the leaves from two hundred plants on each of the sixteen plots were weighed separately and the basis of computation was 7,500 plants per arpent. The results obtained are given in the following table:—

	No. of	Plots. Weight of leaves of two plants.	Yield per acre.
<u> </u>		Lb.	Lb.
Nitrogen experiment		1 31	1,152
U U		2 33	1,226
II II		3 38	1,415
II II		4 40 5 29	1,500
Potash, experiment			1,087
H (6 31	1,152
D H		7 . 38 `	1,415
Phosphoric acid experiment		8 41	1,537
d 9		9 36	1,340
H . H		.0 41	1,537
H H		.1 40	1,500
H	-	2 3 37 30	1,377
Seneral formula	4	.3 . 30	1,115
II		4 31	1,152
H		5 33	1,226
H		.6 33	1,415

Conclusions.—Plots 9 and 10 gave the best yields: the first of these plots had received 250 pounds sulphate of ammonia, 180 pounds sulphate of potash and 100 pounds superphosphates; the second, 250 pounds sulphate of ammonia, 150 pounds sulphate of potash and 80 pounds superphosphate. The conclusion is that the nitrogenous element plays the dominant part. A glauce at these figures shows that the yields are in proportion to the quantity of sulphate of ammonia applied; plots 4, 8, 12 and 16 are the best yielders of the series. Furthermore, when considering the first four plots (experiments on nitrogen) it is seen that the yields increase as the quantity of sulphate of ammonia is increased; for a double quantity of nitrogen there is an increase in yield of 348 pounds.

No less important is the part played by potash.

The two maximum yields of 1,537 pounds correspond to a strong application of sulphate of potash (180 pounds in the first case and 150 pounds in the second). It appears that potash has more effect than nitrogen since the total yield obtained from a mixture of 300 pounds of sulphate of ammonia and 150 pounds potash (No. 4) is not so large as the yield resulting from the application of 250 pounds of sulphate of attention and 180 pounds of sulphate of potash (No. 8). As for nitrogen, the more sulphate of potash is applied the higher the yields are, with this exception that the maximum yield of 1,537 pounds corresponds to the maximum quantity of sulphate of potash used (No. 8).

With regard to phosphoric acid, things are quite different. The results obtained on plots 9, 10, 11 and 12 show that only a comparatively small quantity of phosphoric acid is required; 80 pounds would be the most profitable quantity. With equal quantities of nitrogen and potash, an increase in the proportion of phosphoric acid causes a material reduction in yield. An excess of superphosphate appears to be detrimental, as shown by the results on plot 16. This plot 16, which had received the greater quantity of uitrogen, potash and phosphoric acid, has not given the highest yield (only 1,450 pounds). One of the most satisfactory results of this experiment is that we now have sufficient data to establish an optimum formula, that is, the most profitable formula, since, according to our figures, the yields may be represented by a curve presing through the maximum. The whole question now is to ascertain what this maximum is.

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A choice therefore has to be made between the formula used on plots 8 and 10. Before concluding, however, let us examine the crop obtained on these two plots. As regards tissue, plot 8 gives a thicker leaf than plot 10, as elastic as the latter but with far better burning quality. Therefore, there is a larger number of leaves per pound in No. 10 than in No. 8, which is very important as thin binders always have the preference. Again, in No. 10 there are 24 pounds of median leaves for 200 plants against 20 pounds in No. 8. Outside of the burning quality, the formula used on No. 10 gives the better results.

To sum up, everything considered, viz., yield, tissue, burning quality, the following formula may safely be recommended: 250 pounds sulphate of ammonia, 180 pounds

sulphate of potash, 80 pounds superphosphate.

The above is a combination of formulae 8 and 10 in which the quantity of potash used in No. 8 takes the place of the quantity used in No. 10.

. OTHER CROPS-OATS AND CLOVER.

The preparation of the soil for seeding was started on May 12. The following instruments were used: double disc-harrow, grubber, smoothing harrow and roller. This work was done under good conditions. Eight arpents were prepared in this manner and sown with Banner Oats and clover—one bushel and a half of oats and 15 pounds of clover per arpent. The germination was good for the oats as well as the clover. A few days after the oats were up, they were rolled twice. We did the same with our clover last year as soon as the ground was in good shape.

The oats gave a fairly good yield, 22 bushels to the arpent as an average, giving a total crop of 216 bushels that were kept for the horses. The thirty arpents of clover sewed in 1913 gave a total crop of forty tons, which is not quite one and a half tons per arpent. Two tons were obtained on some parts but in the upland, near the river, the crop was rather poor and it had to be cut early on account of the presence of

daisies, mustard and other weeds.

With the exception of eight arpents which are now in clover, the whole area of the farm was ploughed with a double Brabant. This plough, which is comparatively little known in this country, does remarkable work. Its chief advantage is a considerable saving of time, as it can be reversed at the end of the furrow, without turning.

On the part of the farm selected for mixed crops, eighteen tons of manure to the

arpent were ploughed under 9 inches deep.

IMPROVEMENTS.

Work in the ravine.—As stated in last year's report, the object of this work was to increase by four arpents the arable part of the farm. A dam was built in 1913 and the ditch was straightened out this year. This has required a month and a half of work. In several places the ditch was ten feet wide, it was filled with the earth from the numerous knolls that were in the ravine. The two abrupt grades were decreased, which enabled us to level the ground at the same time.

A little Cuban was planted on the new part of the farm: The crop was not very large but there are reasons to believe that this part will become one of the most fertile.

The rest of the ravine was sown in buckwheat which was ploughed under early in the fall. A good deal of clearing was done and practically the whole of the farm was ploughed in the fall. There is now about only half an arpent that could not be ploughed before the winter.

After completing the house of the manager, a cement sidewalk 500 feet long

was laid down and a large quantity of earth hauled for the lawn.

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Lastly, to collect the water on the road and on the western part of the farm, it was necessary to place underground a tile drain 18 inches in diameter and 250 feet long. This drain starts from the road, crosses a part of the ravine and empties into the ditch.

Drainage.—Some fifteen arpents of this farm had been drained in 1913 as reported. This year, six more arpents were drained between the Canadian Pacific railway line and the road leading from Farnham to St. Brigide. The nature of the soil and of the subsoil was determined. It is as follows: (1) an arable layer, 10 inches deep, composed of sand with a little grey clay, very fine; (2) a layer of yellow sand with a fair proportion of clay, fairly compact, 20 inches thick; (3) blue sand with mark, as far as the water level.

Owing to the composition of the soil and the lay of the land the following method was adopted: small drains are laid along the line of the greatest slope and they open in the main drain at a very acute angle. These small drains have a regular slope, increasing as they go, but never exceeding 0.065 per cent. They are placed at an average depth of 5 feet 6 inches and 45 feet apart. A collector, 6-inch interior diameter and 380 feet long collects all the water from the small drains. This collector empties into a ditch which throws itself into the Yamaska river. For reasons of grade and facilities, the collector was passed under the road, to enable us to use a good discharge.

Five thousand two hundred and twenty-six feet of drain were required for this work. Another field of three arpents was also drained. This field has the shape of an inverted roof, the ridge of which has a rather strong slope. A six inch collector was placed along this road and three smaller drains 125 feet long each, on each side. The main drain, on account of the configuration of the land, has the shape of a Y.

LABORATORY.

Nicotine tests.—About seventy-five samples of tobacco were tested to ascertain the percentage of humidity. Schloesing's method was followed in this test: a standard tobacco is made, analysed very carefully, and all other tobaccos are expressed in proportion of this standard.

The extraction of nicotine, in the case of the standard tobacco, was made by repeated washings with salt water. This water was then treated with ether. This operation required three passages of ether. The results of this first analysis were checked by another analysis with Tungsten which is also well known as the best reactive for alcaloids.

The standard tobacco was a mixture of Big Ohio and Erbesanta; the following yields in weight of nicotine per hundred pounds of dry tobacco were obtained:

1.	Colorimetric method.	 		 	 7-77	%	7.80	%
	Tungsten method							%

The actual analysis was computed at 7.785 %.

The washings, as for the other analyses, were made in duplicate.

The samples to be examined were treated with soda to displace nicotine, then gasoline was used as a dissolvent after twelve hours' action. In short, it is the Allegrain process, slightly modified.

The virages were made in the presence of distillated water which makes it much easier to ascertain the passage from the alcaline condition to the acid condition. Twelve samples were operated on and of course an analysis of the standard was made for each series. In all cases the complete extension process give us results one-tenth higher than those obtained with the rapid method.

FARNHAM.

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FARNHAM.

The results of the nicotine tests made with the tobaccos of the 1914 crop are given in the following table:—

Origin of Tobaccos Analysed and Indications of Varieties.

Central Experimental Farm, 1914.	Per cent of toba	nicotine in any
Persian Rose Yanaska Belgian Maryland Perfum d'Italie. Comstock (St. Jacques seed) " (St. Césaire seed) Connectiout Seed Leaf. Connectiout Broad Leaf. Big Ohio x Sumatra (median leaves). St. Félix (median leaves). Las Almas (median leaves). Canelle P. Canelle P. Canelle R. Small Havana Mir " Bl. " Ferg. Tabac Rouge Ferg. Feuille d'Or. Big Havana Herzégovine Stolak " " (imported seed) " " (imported seed) " " (virginia x Herzégovine No. 37 " " (imported seed) " " X Virginia No. 52 Erbasanta Crop 1913). (Experimental Station, Farnham, P.Q., 1914.)	2·09 2·30 2·24 2·88 3·08 3·14 2·75 2·13 2·91 2·77 2·50 2·54 2·93 2·87 3·28 2·50 2·31 2·28 2·25 1·94 2·28 2·28 2·25 1·91 2·77 3·66 3·25 1·94 2·77 3·66 3·25 3·26 3·36	2 · 14 • 2 · 38 2 · 28 3 · 00 3 · 12 3 · 12 2 · 11 2 · 95 3 · 02 2 · 57 2 · 96 2 · 91 3 · 34 2 · 70 2 · 25 2 · 25 2 · 31 2 · 23 2 · 23 2 · 23 2 · 25 3 · 02 2 · 57 2 · 96 2 · 91 3 · 34 2 · 70 2 · 50 2 · 25 3 · 30 2 · 25 3 · 34 2 · 70 2 · 50 3 · 71 3 · 22 3 · 52 2 · 57 3 · 11 8 · 95
Comstock Spanish 1st cure (light). " " 2nd cure (light). " " 1st cure (dark). " 2nd cure (dark). (Experimental Station, St. Jacques, P.Q., 1914.	1·80 2·14 2·00 2·2£	1.87 2.18 2.02 2.30
Comstock Spanish. Herzégovine Giant. (Harrow Station, Ont., 1914.)	2·40 2·42	2·25 2·44
Herzégovine Stolak (light red) Virginia x Herzégovine (light red) " (yellow). Warne (dark red). " (yellow). Warne (dark red). " (yellow). White Stem Oronoko (yellow). Yellow Pryor (dark red). " (light leaves). Virginia x Herzégovine x Virginia (light red). Broad Leaf Stand up Burley (dark red). " " (light red). " " (light red).	2 · 50 2 · 20 2 · 44 2 · 30 2 · 25 2 · 00 2 · 12 2 · 42 2 · 18 2 · 30 2 · 32 2 · 33 2 · 57 2 · 60 2 · 71 2 · 67 2 · 23	2 · 48 2 · 24 2 · 51 2 · 32 2 · 28 2 · 16 2 · 15 2 · 50 2 · 16 3 · 35 2 · 36 2 · 40 2 · 11 2 · 54 2 · 54 2 · 57 2 · 65 2 · 70 2 · 65 2 · 25

ORIGIN of Tobaccos Analysed and Indications of Varieties .- Continued.

Central Experimental Farm, 1914.	Per cent of nicotine in any tobacco.			
Improved White Burley (light red)	2·38 2·25 2·26 2·26	2·42 2·25 2·24 2·30		
Havana Seed Leaf Comstock Spanish (seed plant leaves). White Burley (Picton, Ont.). Green River (Walkerville, Ont ₀). Comstock (Sta. Catharine). Comstock Spanish	2·80 2·97 1·96 2·44 2·71 3·26	2·84 3·00 1·94 2·51 2 68 3·35		

The above figures represent the percentage of nicotine in dry tobacco. The average proportion of moisture in the standard tobacco was 16.90 per cent. For the determination of the nicotine in the standard tobacco, an acid sulphuric solution was used, of such strength that each division of the pipette corresponded to 0.005 gram of nicotine. This method is very rapid, as a large number of analyses may be made at the same time and it is not necessary to know exactly the strength of the sulphuric acid solution or the proportion of moisture. The main thing is to have the standard sample and the tobaccos which are to be examined under the same conditions as regards grinding, moisture, temperature, etc.

ANALYSES OF SOILS.

An analysis of soils was made at the Farnham farm to ascertain the needs of the soil and the variations in the chemical composition. The figures show that the average fertility of the soil of the Farnham station could be improved upon.

In one case only (No. 10) chlorine was found. This is the plot which gave poor burning tobacco.

ANALYSES of Soils at Farnham, Que.

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.
Moisture Nitrogen Phosphoric acid Potash Peroxide F. M Lime Humic acid Silica Alumina Magnesia Sulphuric acid Nitric acid Chlorine	7.64 0.061 0.71 2.40 4.20 0.54 4.80 68.10 12.00 0.40	8:15 0:044 0:59 2:53 4:18 0:60 4:50 67:40 10:44	9·40 0·040 0·88 2·29 4·02 C·55 4·00 69·16 11.17	6.76 0.54 0.66 2.38 4.17 0.58 3.93 67 14 11.28 0.38	6.70 0.058 0.69 2.47 4.21 0.60 3.94 68.17 11.80	7 · 81 0 · 031 0 · 62 2 · 33 4 · 01 0 · 59 4 · 00 69 · 20 11 · 44	6·73 0·062 0·77 2·41 4·16 0·52 4·40 69·22 12·10 0·37	5.84 0.054 0.84 2.41 4.21 0.52 4.52 70.11 11.81	6:00 0:048 0:79 2:39 4:19 0:47 4:73 70:16 11:74 0:44 Light traces.	6·25 0·057 0·83 2·45 3·92 0·57 5·00 68·70 11·92	6:40 0:052 0:71 2:50 4:00 0:61 4:77 70:40 11:09 0:41 Heavy

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It may be stated that the various parts of the farm have practically the same chemical composition. It is a soil of average fertility, fairly rich in essential elements.

With good manuring, a judicious use of chemical fertilizers and a short rota-

tion, this soil should be put in good condition fairly quickly.

In 1915 we will again be at the starting point of the three-year rotation and a rather important improvement is already noted. For instance, plot No. 1, which will be in tobacco for the second time in 1915, is the richest in nitrogen and humic acid, and it is well known that, in a work of this nature, the proportion of nitrogen is the most important data.

STATION OF ST. JACQUES L'ACHIGAN, QUE.

The following varieties of tobacco were grown on this station in 1913-1914:—Comstock Spanish, Cuban, Yamaska, Big Ohio x Sumatra.

Other varieties were also tried on a small scale in the garden, behind the building which is used as office and stripping room, as follows:—1 White Burley, 1 Warne, 1 Giant Herzegovina.

SOWING.

Some 600 square feet of beds were used for seeding; semi-hotbeds were used, that is, the layer of fermenting manure was replaced by a layer of tobacco stalks, well packed down.

The sowing was done on the 27th of April, dry seed being used on black mould, which had been disinfected with formalin. The seedlings were up on May 3, six days later, except on the bed of Cuban which was up only on the 9th of May. The Cuban seed was old and of poor quality.

The development of the seedlings took place without incidents, with the exception of a little efflorescence on the surface, caused at the start by the rapid evaporation of too concentrated solutions of chemical fertilizers. They were quickly reduced by light sprinklings, often repeated,

A sufficient number of seedlings was obtained with the exception of the Cuban which were a partial failure. On account of this fact, a reduction was made in the area which was to be planted in this variety.

TRANSPLANTING.

The area to be planted in tobacco had been in clover in 1913. It was ploughed in the fall but the manure that it was intended to apply in the fall came much too late. It was spread on top of the ploughed land and incorporated with the disc harrow. It was ploughed under in the spring on May 12. Chemical fertilizer was mixed with the soil by means of the disc harrow, on the 6th of May, the following quantities being used:—

Sulphate of ammonia							
Superphosphate	 	 	 	 	 	135	**
Sulphate of potash	 	 	 	 	 	200	4.6

The preparation of the soil was completed the day before transplanting by double discing crossways, and the smoothing harrow. Transplanting was started on the 3rd of June, taking advantage of the wet period which, unfortunately, did not last long enough.

The seedlings suffered a good deal from the drought and the cutworms which displayed extraordinary activity in the spring of 1914-1915; a great many had to be reset until the end of June.

The growth was rather slow. The crop suffered very much from the drought in spite of the repeated cultivation by which it was endeavoured to reduce the evaporation at a minimum. However, the Comstock, Big Ohio x Sumatra and Yamaska gave a fair crop but the Cuban did very poorly.

The White Burley and Warne, which were grown to find out if they could ripen soon enough to be converted into yellow tobacco by the due-carring process, were much

too late. It was the same with the Big Havana.

These three varieties were far from reaching their full size. The results were not much better with the Giant Herzegovina. It should be stated, however, that the soil in the corner of the garden where these varieties were tried, was much heavier than the average soil on which tobacco is grown in the northern region. Some plants of Giant Herzegovina grown in our foreman's garden on a light soil, in the north of St. Jacques, gave undersized leaves but with a rather bright colour and a more supple texture than those of the same variety of tobacco grown at Ottawa. The following table shows the date of transplanting, the number of seedlings used and the yield in weight per arpent and per acre of the varieties of tobacco grown at St. Jacques in 1914.

Date of				Number of	Gross	Yield.		
planting out.		Varieties.	Varieties.	plants.	weight.	Per arpent.	Per acre.	
n 4-8	Yamaska. Big Ohio	Spanish		6728 3996 4144 3600	Lb. 984 480 670 - 198	Lb. 1263 1038 1396 534	Lb. 1490 1225 1647 630	

The yield per arpent is satisfactory for a season like 1914, with the exception of the Cuban. However, they would be much better if it were not for the system of ploughing that we have to use on the station of St. Jacques, in order to facilitate the escape of the water. The plants in the low parts of the land are always undersized, in spite of the tendency among the farmers to put the rows next to the furrows wider apart, a practice causing a loss of space that might be avoided if the ground for tobacco was drained.

SELECTION.

The main part of the work of selection was done on two varieties, Big Ohio a Sumatra and Yamaska. The aim for the first of these varieties is to obtain a good type of pipe tobacco with a large leaf, a light texture, and several types of tobacco for cigar wrappers. In the Yamaska, an endeavour was made to select binder types yielding as large proportion as possible of leaves of 20 to 22 inches long, with an oval to rounded shape.

WÍLTING ON THE FIELD.

The object of wilting on the field is to make the leaves more supple and reduce the breakage to a minimum during the hauling from the field to the curing-house and the hanging up of the tobacco. There is another advantage: a large quantity of water is eliminated before the tobaccos are put in the curing-barn and the duration of the curing is therefore materially reduced.

However, when wilting is done in the usual manner: the tobaccos are left in small heaps on the field for a rather long time, the leaves are exposed to various injuries, showers, fermentations, etc., and the prolonged contact with the soil has a tendency to fill the leaves with mud or sand, which stays with them until they are delivered at the warehouse or at the manufactory.

The use of movable stands could do away with all these objections. The tobaccos are hung up a few hours after cutting, they remain only a short time in contact with the soil and are thus protected from the rain as green tobaccos are very little injured

ST. JACQUES L'ACHIGAN.

by the latter when not in heaps. The laths should be set sufficiently close to induce a slight fermentation, causing a wilting and yellowing of the leaves, but not so close as to prevent the rainwater from running out quickly in case of a sudden shower. A damp-proof canvas cover should be used during the night, against rain or frost.

CURING.

The use of charcoal heaters has given very good results on this station. These heaters are used in the latter part of the curing when it is desired to reduce the leaves and to avoid moulding. With a little practice this method may be very useful during the first part of the curing (yellowing of the leaves) when fears of pole burn are entertained on account of the prolonged rain.

TAKING DOWN AND GRADING.

At St. Jacques station the crop was taken down at the end of November. It was at once stripped, graded in bottom, median and top leaves and trash, and shipped to Farnham at the end of December for final grading and packing.

The St. Jacques crop suffered a great deal from the drought which was the cause of the great proportion of yellow leaves. These yellow leaves find a ready sale on the market but their production is always accompanied by a lowering of the general value of the crop as well as a decrease in weight.

EXPERIMENTAL TOBACCO STATION, HARROW, ONT.

W. A. BARNET, B.S.A., MANAGER.

The season of 1914 was a very favourable one for the starting and subsequent culture of tobacco. Cool weather and a fair amount of moisture prevailed during the greater part of the planting season. This made it easy to get a uniform stand of plants in the field. Nevertheless the weather conditions were quite favourable for the work of the cutworms. The ravages of this insect were severe in many fields necessitating much replanting.

During the first part of the planting operations the cutworms were held in check by using the poisoned bran mash, putting about one tablespoonful around each plant. In a portion of the area the mash was not used, and there was quite a marked difference in the stand of plants. Much more replanting was required over this area. Considering the number of plants needed for resetting, the pulling and planting of same and the lack of uniformity in the crop in some fields, the writer considers from three years' experience with this preventative, that it is an easily applied, effective and feasible remedy.

CORN EXPERIMENTS.

Manure was applied at the rate of 12 spreader loads per acre to that portion of the ground that was not manured the year previous. One plot about 4 acres, being top dressed in 1913 was neither manured nor fertilized. In short, no fertilizer was applied to the corn ground this season.

Two acres was planted with Golden Glow variety on May 28. The balance of the corn ground was planted with the Improved Leaming. The average yield per acre was 125 bushel baskets. On our soil the Leaming matures fairly well, but it does not come to the same degree of maturity in a given time that the Golden Glow reaches. While the latter variety does not give as large a yield as the Leaming, still the Golden Glow gives better satisfaction, in that it yields a harder, more weighty ear, with a fairly deep kernel closely placed on the cob.

In short the Golden Glow Yellow Dent corn is a variety the writer would recommend judging from our three years' experience with it at the station, and from the results obtained, both in other parts of the county and in one of the leading ensilage, growing districts of Ontario.

A part of our corn ground for the 1915 crop is being manured at the rate of 8 loads per acre. Four and one-half acres of clover sod seeded with barley as a nurse crop in 1914, will not require manuring. But that portion of the area which was cropped in tomatoes and tobacco in 1914, and which was seeded with rye as a cover crop will be top dressed at the above rate. No fertilizer will be applied, as the writer does not consider the application of this material is an economical practice in corn growing.

On account of the extension in the area of the experimental station, we expect to grow 10 acres of corn in 1915 and handle the choice ears of the crop according to the most approved methods of curing corn in seed-corn houses. Heretofore we have sorted out the marketable seed corn in the fall, and put it in a dry well ventilated crib. However, this method will not always give seed with a strong germination at planting time, although our customers have been pleased and our business has increased.

COVER CROPS.

RYE AS A COVER CROP.

On account of the tobacco ground being left bare and liable to a loss of valuable plant food through leaching, rye was sown on September 29 and October 1, on the 15 acres planted in tobacco in 1914. The rye made a good top growth. When it reaches a height of a foot or eighteen inches it will be ploughed under in the spring. The writer believes that while rye will not add much plant food it will increase the humus in the soil and prevent wasteful leaching in the early spring.

HAIRY VETCH AS A COVER CROP.

On September 27 hairy vetch was sown by hand in the corn. The crop was then given another cultivation. On account of warm moist weather prevailing the seed germinated rapidly and made a very good top growth before winter set in.

CLOVER AS A COVER CROP.

On September 30 clover was sown on another portion of the corn ground. Likewise it made a splendid growth. The alternate freezing and thawing in early spring will demonstrate the usefulness of this crop as a cover crop. On former occasions the writer has not had marked success with clover sown in corn just previous to the last cultivation. The young plants could not withstand the changeable conditions of early spring, and seemed to succumb to the alternate freezing and thawing. This season the crop did not winter-kill, and an excellent stand was procured.

DRAINAGE WORK.

A system of drains started on a five acre field in 1913 was completed during the carly part of the spring. The main drain was extended and all the laterals put in. As was mentioned in a previous report, the present outlet for this system of drains is two deep cement curbed sand traps, the bottom of which is a coarse gray sand which is in itself a porous filter. During recent heavy rainfalls and thaws in February and March, the water which heretofore lay in the low-lying basins of the field rapidly disappeared. Since putting in this system of drainage we have had ample proof that the sand traps are taking care of the drainage water, thus overcoming the collection of water in the basins and the drowning of crops experienced in former years. We had an excellent crop of tobacco on the drained area.

PLANT BED EXPERIMENTS.

Plant beds were established according to the following methods:

Cold bed with glass covering, ordinary sandy soil manured.
 Cold bed with glass covering with a thin layer of black virgin soil applied and

fertilized.
3. Cold bed glass covering, open bottom, straw and fodder below, with a thin layer of black virgin soil applied and fertilized.

4. Cold bed cotton covering, sandy soil manured and fertilized.

5. Hot bed cotton covering ordinary gray sandy soil manured.

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BRIGHT TOBACCO BEDS.

On April 17 and 18 the following varieties of the flue cured type were sown with slightly swollen seed:-

1. Erzegovine Stolak.

2. Virginia x Erzegovine Giant.

3. Erzegovine Giant.

Virginia x Erzegovine x Virginia

5. Yellow Pryor.

6. White Stem Oronoko,

Abcock.

8. Warne.

All of the above varieties showed good germination with the exception of the Abcock which was almost a failure.

The above beds were fertilized at 1/10 of a pound per square foot, with the single fertilizers, sulphate of potash, superphosphate and nitrate of soda mixed in equal proportions by weight. Black soil was applied to the ordinary soil, the fertilizer added to the top layer and raked in lightly. The soil was made firm with a plank after sowing.

The seed came up uniformly and made a good growth, plants were ready for transplanting June 1. The seedlings of the Virginia type varieties, the first four names mentioned above, are easily grown. The stand was a little thin on the Warne beds but the plants were of the large, strong, stocky type. The thinner seeding invariably gives the best type of plant to start in the field and withstand the intense heat which sometimes occurs at planting time.

BURLEY BEDS.

The Improved White Burley seed of our own selection was sown under glass in a cold bed the soil of which was treated and fertilized as for the bright tobacco beds. Germination was slow but after the plant got started this variety made a good showing. On April 20th the following varieties or strains of Burley obtained from the Kentucky Experiment Station were sown.

- 1. Pointed Leaf White Burley.
- 2. Station Standup Burley.
- 3. Broad Leaf White Burley
- 4. Broad Leaf Standup Burley.

The soil on which this seed was sown had previously grown Warne and Burley plants for 3 years in succession, black virgin soil being added to it on two occasions. In 1913 the plants on this ground were almost a failure being badly affected with bedroot rot. However, the soil was a friable, dark, rich, sandy loam—an ideal plant bed ground. Being advised that if it were treated thoroughly, it would produce good Burley plants, the writer had the ground sterilized before sowing the seed. The result was some of our very best Burley seedlings were grown on this area. The disease was overcome and the weed seeds were killed by the sterilizing. Had the bed area not been treated, as was a small portion in one end of the bed, the plants would have been a failure as was shown by this untreated section.

Conclusions from Plant Bed Experiments.

1. A combination of the single fertilizers nitrate of soda, sulphate of potash and superphosphate mixed in equal proportions by weight and applied at the rate of 10 of a pound per square foot gave excellent results as a plant bed fertilizer. As a safe-

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guard against burning the young germ, should sprouted seed be used, the writer would recommend applying the soda say 3 or 4 days before sowing the beds.

2. The practice of sowing Burley beds on the same area for more than one or two

years is a risky one unless the soil has been changed or sterilized,

3. As in former years the cold bed glass covering gave plants about 10 days earlier than the cold bed with cotton covering.

DISINFECTION TO OVERCOME THE "ROOT ROT," "THIELAVIA BASICOLA."

STEAM STERILIZATION.

Some 2,000 square feet of bed area was disinfected on April 16 and 17, primarily to overcome the effects of the "root rot." The result was all weed seeds were killed at the higher temperatures, and very slight traces of the disease were noticeable, in any of the beds. It was noted that while the plants did not start quite so quickly the first 10 days, the latter growth was much more rapid than on unsteamed soil.

Method of Treatment.—The soil to be steamed was gotten ready. An ordinary steam engine was used to furnish the steam. Connections were made between the engine and the pan by means of short pieces of rubber hose and the necessary lengths of ordinary galvanized piping. The pan used was 12 feet long, 6 feet wide and 8 inches in depth. It was made of heavy gauge galvanized iron securely fastened to a light wooden framework. Two handles were riveted to each side for convenience in handling. A small piece of 3-inch pipe in one corner of the pan, served as a steam inlet.

The pan was inverted over the bed and the edges pressed into the soil so that no steam could escape. The steam was turned into the pan for 30 minutes at 100 pounds pressure. The pan was then placed on the next section to be treated and the operation repeated. In this way nearly 1,200 square feet may be treated in one day. Precaution was taken not to introduce any unsteamed soil into the beds.

ADVANTAGES OF STERILIZING BEDS ..

1. The killing of all weed seeds, disease and insect pests.

2. The increased earliness, vigour and uniformity of production of plants.

3. The cost of weeding beds is reduced to a minimum.

Recommendation.—In case a grower feels he does not wish to invest in a pan a few growers might easily co-operate in having a steaming pan made and in renting a steam engine.

Tests in steaming beds for varying lengths of time:

1	section	20	minutes	at	100	pounds	pressure.
1	66	30	ec	66	100	66	
1	46	40	66	6,6	100	66	. 66
1	66	60	66	66	100	44	66

There was no appreciable difference in the growth of the seedlings in the different sections. The area which was treated for 60 minutes did not give any better seedlings than that portion treated for 20 minutes. Judging from one year's experience, if the pressure is carried at 110 to 120 pounds for 20 minutes the results are satisfactory. However, generally speaking to get effective and safe results it is preferable to treat for 30 minutes at 100 pounds, particularly if you are using but one pan, and moving it immediately with each change of operation.

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FORMALIN TREATMENT FOR OVERCOMING THE PLANT BED DISEASES.

The soil was first removed to a depth of 6 inches, straw and coarse fodder was tramped in and the soil replaced. A formalin solution was made of 4 pounds formalin in 2 barrels of water. This quantity was used on 140 square feet of bed area. The solution was applied in two applications. Old sacks were spread on the treated soil to prevent the escape of the fumes, and the sash also placed on the frames. Swollen seed was sown on this treated area April 23. The plants came up more rapidly than on steamed soil. They made a rapid growth up till the time of transplanting June 15, when the leaves started to turn yellow, and the plant itself seemed to be starving for nourishment. On examination it was found that the roots of many of the seedlings had turned dark and the young fibrous root hairs were not developed, a clear indication of bed root rot. Evidently the treatment using this strength of formalin solution was not a success. Possibly the solution was not of a sufficient strength to be effective. The writer noted that the weed seeds germinated very readily on this area; and it was necessary to weed the beds three times to give the plants a chance to grow.

IDENTIFICATION OF THE BED-ROOT ROT.

The top growth of the plant remains at a standstill. In some cases the seedlings, particularly those of the Burley variety, present a sickly yellow appearance. The bright and dark types of tobacco, for example. Warne, Yellow Pryor and Connecticut Seed Leaf, do not show this yellow, unnourished appearance. The leaf of the seedling maintains its green cast, but the plant stands still.

Upon examining the roots of either of the above mentioned types, it will be found that the root system is not developed, particularly there is an absence of the ramification of the fine rootlets. Further the ends of the main roots and even the extremities of the fine root hairs present a dark, dead appearance as though they had been burned. The writer has found many beds affected with this disease and the grower could not understand the cause why his plants were not doing well.

Recommendation.—The writer would highly recommend the steam treatment of beds as mentioned above as a safe means of overcoming this disease in the beds. If your plants are perfectly healthy when transplanted you are not so likely to transmit the disease from the bed to the healthy soil of the field. Undoubtedly this bed-root rot, as we find it so prevalent in tobacco fields of this county, originated in the plant bed.

TOBACCO ROOT-ROT OBSERVATIONS.

In 1913 we had a two acre plot of Burley which made an uneven growth; it might be termed a partially Burley sick soil. The observations the writer made in the field were as follows: Plants on certain rows in the plot seemed to have stopped growing. The dwarfed plants were often attacked by the mosiac disease; but sometimes the stunted or dwarfed plants bore no traces of this mottled appearance, but simply seemed to have stopped development.

This latter case applies to fields the soil of which was still healthy at planting time, but the diseased plants have been taken from the diseased plant bed. But in the more exaggerated cases in other fields in the county the writer has noticed whole fields which presented an uneven, dwarfed appearance, in which case the disease has been prevalent in the field and has affected previous crops but was unrecognized,

The writer considers that in the case in question on the farm at Harrow the disease was transmitted from the infected plant bed to the field. The root system of many plants were so seriously affected that the feeding powers of the fine root hairs were cut off so completely that the plant was merely surviving on a limited supply of plant food.

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Undoubtedly this disease has been prevalent in many fields which have been closely cropped with Burley but it has never been recognized. One must admit that a case is somewhat difficult to diagnose unless you are thoroughly acquainted with the symptoms. The grower should feel at liberty to send any diseased specimens to H. T. Güssow, Dominion Botanist, Central Experimental Farm, Ottawa, for identification.

The situation is not improving and if we were to study the facts as expressed by many growers, "My ground is Burley sick, I shall have to grow a crop which is easier on the soil," we should find in many cases, that the soil was infected with the "Root Rot." We might substitute for the Burley other varieties of smoking tobacco as Connecticut Seed Leaf, Big Ohio, Golden Seal, Comstock Spanish, which are more resistant. However the market for such varieties is not favourable, and even these kinds become badly affected.

It is believed that through a process of selection and breeding a disease resistant

strain can be worked out.

PRECAUTIONARY MEASURES.

The soil of the seed bed which produced sick plants in 1914 must be either discarded or steamed for 20 to 30 minutes with pressure at 100 pounds. To treat the bed area secure a pan the width of your beds 8 to 12 feet long and about 8 inches deep. A serviceable and inexpensive pan can be made by securely nailing galvanized roofing to four pieces of 2-inch x 4-inch oak scantling and soldering the seams so no steam may escape. Have an intake in the form of a short piece of galvanized pipe securely fastened in one corner of the scantling frame. One handle on each side of the pan would make it more convenient to handle.

The writer saw some beds last spring which were prepared and cared for alike. Part of the bed area was disinfected with steam and a portion left not treated. At the time of my visit there was at least 3 weeks difference in the growth of the plants. In short the untreated portion gave promise of being a failure, while the treated area was producing healthy seedlings with very little work required in weeding the beds.

Adopt a longer rotation, say corn, cereals, clover, followed twice in succession before planting Burley on the soil. The above precaution applies particularly to an

area of ground which has been frequently used for Burley tobacco.

Let the farmer consider as diseased a field on which a very uneven growth of tobacco was observed in 1914, and be convinced that growing tobacco continuously on the same soil is a risky and exhaustive practice.

FIELD EXPERIMENTS WITH FLUE-CURED TOBACCO.

Five acres of flue-cured leaf were planted from June 3 to June 13.

The ground was treated as follows: A 2 acre plot was given an application of:—

300 pounds superphosphate per acre.

300 pounds sulphate of potash per acre.

A 3 acre plot was fertilized at the rate of:-

300 pounds superphosphate per acre.

200 pounds sulphate of potash per acrè.

The fertilizer was harrowed in just before the ground was rolled and planting commenced.

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The object of applying this fertilizer was to hasten the growth but more particularly to aid in maturing the crop earlier in the season during the hot dry weather in August. It tends to brighten the colour because of its decided effect in ripening the leaf.

The above area was planted quite close, 3 feet by 21 inches. The object of the closer planting was to grow a smaller plant and by so doing to get a smaller, thinner leaf of brighter colour. The writer would say that the object was attained to a large degree. The percentage of bright red and bright leaf was greater than in former seasons although the crop had been grown on the same soil for 3 years previously. Particularly was this statement true of the Warne variety.

The following varieties of flue-cured tobacco were tested on the above mentioned 3-acre plot:—

8 rows Erzegovine Stolak, planted June 3.

10 rows Virginia x Erzegovine, planted June 3.

9 rows (½ acre) Yellow Pryor, planted June 11.

9 rows († acre) White Stem Oronoko, planted June 11.

9 rows (½ acre) Virginia x Erzegovine x Virginia, planted June 11.

9 rows (½ acre) Erzegovine Giant, planted June 12.

2 acres Warne, planted June 12.

COMMENTS.

The two varieties Erzegovine Stolak and Virginia x Erzegovine of the first planting made a very rapid growth and were ready for harvesting at least fifteen days before any of the other varieties.

Harvesting was commenced August 27, and these two varieties were a little overripe even at this date, the leaf showing up fairly yellow in the field. However, after curing the colour was not as good as was expected. There was a small percentage of the bright grade. In texture the leaf was very thin and light; it was lacking in body and character. The aroma of these varieties was good.

Considering our particular conditions of soil and climate the Yellow Pryor and the White Stem Oronoko are two very good varieties for flue curing. The Yellow Pryor does not differ much from the Warne in habit of growth and in the length of time required for maturing. The White Stem Oronoko, a smaller growing variety than the Yellow Pryor or Warne, gave a small leaf, but the colour, texture and character of leaf were very fair. These two kinds are slower growing and require much more time to mature than any of the Italian types. The Virginia x Erzegovine x Virginia gave a rather coarse textured leaf, with only a small percentage of the bright grade. The Erzegovine Giant cured up a good colour. There was quite a large percentage of the really bright shade in this variety. The leaf was light in weight and thin in body.

The Warne cured up a brighter colour than in previous years, presenting a leaf of strong body and fine texture. The soil, while not of an ideal bright tobacco type, is becoming depleted in nitrogen and better adapted for the growing of Warne. Our soil contains too large a percentage of clay for best results.

Another two-acre plot of bright leaf was planted on ground that had previously been cropped with barley. One acre was fertilized with 500 pounds of superphosphate while the other acre received no chemical manure. The application of fertilizer was given to aid in the quicker maturing and yellowing of the leaf.

The acre plot not fertilized was planted in Warne. The crop grew quite dark and rank, an indication of too much nitrogen for this type of leaf. The writer believes that where there is a tendency for the plant to grow too large and rough, that closer

planting and quite high topping would give better results. This conclusion is drawn from the past six years' experience with bright tobaccos on a sandy soil with quite a percentage of clay in it. By so doing you will not likely produce such a thick, heavy, oily leaf, what the manufacturer terms "rough."

The other acre fertilized with superphosphate was planted in Virginia x Erzegovine x Virginia. While this variety matured about a week earlier than the Warne, the colour was not as bright as in those varieties of the Italian type mentioned above.

Immediately after planting the 7 acres the poisoned bran mash was applied around the plants. This remedy greatly checked the ravages of the cutworm. By subsequent replanting a very uniform stand was obtained. The entire crop made splendid progress during the latter part of June and July, and was undoubtedly the most uniform field of flue-cured leaf yet grown on the Station. Topping was commenced July 27.

Practically all of the bright leaf was sprayed, using a power sprayer, putting on 4 pounds of lead arsenate to 80 gallons of water. Where the worms were not too large this strength of solution did very effective work. When the grower has a large area, say fifteen to twenty-five acres, the writer believes a power sprayer is a good investment. This machine will do very thorough work, reaching the leaves from above and also from below, throwing an even fine spray to almost all parts of the plant. To obtain the most effective results the crop should be sprayed when the plants are comparatively small and the worms are first noticed. Later on a second spraying should be given using a hand duster and Paris green on the finely powdered lead arsenate. The last application should be given when the tobacco is too large to allow the power sprayer to pass up and down the rows without tearing or breaking the leaves.

However, one spraying would be sufficient if the grower has a small flock of ducks to put in the patch, later on in the season after the poison has lost its insecticidal value. The writer has found that while the ducks do good work, there is a liability of putting too much dependence upon them. Certain parts of a large field where the worms might be very prevalent they sometimes miss.

For a small acreage the writer has found that ducks or turkeys will do very

thorough work, and spraying would not be necessary.

CURING.

The curing process was conducted according to the methods outlined in previous reports. It was thought that there was not sufficient ventilation in the kilns to properly carry on the curing process. Large ventilators were made in the ridge board of the roof of each kiln. When these ventilators are completed they will be under the perfect control of the man in charge of the curing, and, should a superabundance of moisture occur at any period of the curing process, by increasing the temperature and opening the ventilators the excess may be eliminated.

. It is true that through this ventilating system a greater air circulation resulted and the surplus moisture was carried off more easily; but, it is doubtful if any particular advantage in getting a brighter colour of leaf, was attained. However, a more complete series of tests should be carried out before any definite conclusions are

arrived at.

GRADING.

The entire crop was sorted into the following grades: Bright Leaf, Bright Red, Dark Red, Tips and Sand Leaves or Lugs. Each grade was put in a separate bale, and a label attached to each specifying the variety, the grade, the weight and the designation of Harrow Experimental Station. Thus the manufacturer has complete information as to what he is getting. The leaf was not put up in hands as in former years but rather the loose leaf system was adopted. Each bale was wrapped in paper to prevent breaking.

FERTILIZER EXPERIMENTS WITH BURLEY.

The Burley ground was prepared from a clover sod manured at 16 spreader loads per acre, and fertilized according to the outline below. Part of the area was manured the fall and summer previous while the balance of the ground was covered during the winter and early spring. Ploughing was finished the first week in June, and the ground was immediately rolled and double disced. It was again disced, harrowed smooth and fertilized. The fertilizer was harrowed in and the ground rolled before planting.

Fertilizers were applied as follows:-

Plot 1.—Acre plot—
250 pounds nitrate of soda per acre.
300 " sulphate of potash per acre.
300 pounds sulphate of potash per acre.
200 pounds sulphate of potash per acre.
400 " superphosphate per acre.
500 " nitrate of soda.

Plot 3.—Acre plot—
400 pounds basic slag per acre.
200 " sulphate of potash.
250 " nitrate of soda.

Plot 4.—Acre plot—
300 pounds superphosphate per acre.
300 " sulphate, of potash per acre.

COMMENTS.

All the above plots were planted June 4 and 5 at 3½ feet by 32 inches in the row. A good stand was obtained as the weather was cool and fairly moist. However the cutworms were quite numerous and would have done considerable damage had we not used the poisoned bran mash around the plants. By resetting almost a perfect stand was obtained over this area.

The crop made a good growth up till the fore part of August. During the first two weeks of this month dry, cool weather prevailed. The result was this 4-acre plot of Burley took on a marked yellow appearance, particularly was it noticeable in the bottom leaves of the plant. The yellowing was soon followed by a firing. There was an abundance of plants on the higher dry sand, which had four to five bottom leaves badly damaged, practically wasted away. The crop had reached such a stage of development that it did not recover from the effects of the prolonged drouth. The yields were consequently greatly diminished.

Plot 1.—Bordering on a long row of large maple trees, which drew considerable moisture and nourishment from the outside rows, yielded 950 pounds per acre.

Plot 2.—Receiving the heavy application of nitrate of soda yielded 1,077 pounds per acre.

Plot 3.—1,050 pounds per acre and plot 4, 988 pounds per acre. These are comparatively low yields.

The writer attributes the results to the very early planting and the drouth which happened to strike the crop just when it would have made the best progress. Then again quite low topping was practised on these plots, many plants having but 6 to 10 leaves. As a test the stalks were split in Nos. 2 and 3; but there was no appreciable difference in the colour of the leaf or in the thoroughness of curing.

The harvesting of the above area was completed September 5. The seedlings used in the planting were healthy coming from sterilized beds. The writer did not find root rot to be prevalent in field conditions, hence the reason for stating that transplanting was rather early for the 1914 season.

QUANTITATIVE TESTS OF FERTILIZERS.

An area of $2\frac{1}{16}$ acres was ploughed out of clover sod manured at 15 tons per acre and fertilized as follows, each plot containing one-sixth of an acre.

paintenance.	Kind of Fertilizer.	No. of Plot	No. of Plot.	No. cf Plot.	No. of Plot.	No. of Plot.	Yields in Lb. per Acre.
Nitrogen Plots	Nitrate of Šoda		1 240 300 200	2 320 300 200	3 480 300 200	1 2 3	1,758 1,566 1,713
Potash Plots	Nitrate of Soda. Sulphate of Potash. Superphosphate.		4 400 180 200	5 400 240 200	6 400 360 200	4 5 6	1,650 1,902 1,962
Superphosphate Plots.	Nitrate of Soda		7 400 300 120	8 40¢ 390 160	9 400 300 240	7 8 9	1,980 1,905 1,950
General Formula	Nitrate of Soda	13 400 300 200	10 240 180 120	320 240 160	12 480 360 240	10 ··11 12 13	1,956 1,917 1,779 1,884

Number of Plot.	Cost of Fertilizer (Acre basis).	Value of Crop (Acre basis).	Net return per
	· s	8	\$
1/	15 80 17 90 20 30 17 10 18 60 21 60 19 46 19 78 20 42 12 16 16 08 22 12 2) 10	210 96 187 92 205 56 198 00 228 24 237 60 228 60 234 00 234 72 230 04 213 48 226 08	195 16 170 02 185 26 180 50 209 64 213 84 218 14 208 82 213 58 222 56 213 96 191 26 205 98

Comments.—The fertilizer cost was based on the market prices paid in 1914. The value of the crop was considered at 12 cents per pound, the market price obtained.

The object of the test was to find out the amounts of sulphate of potash, nitrate of soda and superphosphate to apply per acre to give the largest net returns. A conclusory statement cannot be made from a single test carried on during one particular season. A series of tests will be required before a definite and accurate conclusion can be arrived at.

VARIETY TESTS OF BURLEY.

The following varieties of Burley were tested. The ground on which they were tried was a clover sod fertilized with 400 pounds basic slag and 200 pounds of potash per acre:—

No. 1. Broad Leaf Standup Burley.

No. 2. Station Standup Burley.

No. 3. Pointed Leaf White Burley.

No. 4. Broad Leaf White Burley.

Comments.—The above strains were obtained from the Kentucky Experiment Station.

The Broad Leaf Standup Burley was a large growing, broad leafed type yielding 1,800 pounds per acre. The habit of growth was similar to that of the Improved White Burley which has been grown on the Station for several years.

The Station Standup was a smaller growing type. The leaves were not so broad and were more pointed and erect. The yield was 1,600 pounds per acre. The pointed leaf strain has a pronounced pointed leaf. The habit of growth was somewhat similar to the Station Standup. The yield was 1,650 pounds per acre.

The Broad Leaf White Burley had a pronounced broad leaf in comparison to the feugth of same. This was a rather coarse growing variety, the mid rib of the leaf being quite prominent. The yield was 1,950 pounds per acre.

EXPERIMENT IN SCAFFOLDING WHITE BURLEY.

One acre of Improved White Burley was fertilized with 300 pounds superphosphate and 200 pounds sulphate of potash per acre. One-half of the plot was set at 3½ feet by 21 inches, the balance was planted at 3½ feet by 28 inches.

The entire acre was put on the movable scaffolding on September 19 and hauled in from the scaffold on September 30. The early part of the fall was favourable for curing, and at stripping time no apparent difference in the colour of the leaf was noted. It is true that the leaf changed from the yellow to the reddish tinge a little more quickly on the scaffold as compared with that hanging in the barn.

Judging from one year's experience in scaffolding White Burley, the particular advantage of the practice is: with a large crop and a limited barn space, scaffolding for two or three weeks will permit of closer hanging in the curing barn without danger of "barn burning."

TOBACCO INSPECTION WORK IN ONTARIO FOR 1915.

G. C. ROUTT, INSPECTOR.

My work as tobacco inspector for the province of Ontario began in April, 1914. After spending the mouth of April in Ottawa where I received instructions from Chief Charlan, Head of the Division, I left May 1 for Kingsville, temporary headquarters for the summer.

Soon after locating at Kingsville I got in touch with some of the growers and buyers. There was a great deal of dissatisfaction among the growers on account of the very unsatisfactory prices received for the 1913 crop, and many had decided to discontinue the growing entirely, or at least decrease their acreage much below that of previous years. I found that many farmers had their 1913 crop still on hand, the buyers claiming that it was too inferior for them to handle since they were overstocked with such grades. I inspected several crops in various localities of Essex and Kent counties and found these statements quite true. The percentage of inferior leaf in the 1913 crop was very large and no doubt was due, in a large measure, to unfavourable weather conditions both while the tobacco was in the field and curing shed. These conditions were brought about to a large extent by the very dry weather during the growing season which retarded the growth and ripening of the tobacco, also by the early frost which caught a number of crops before they were cut. These conditions were further affected by the cold muggy weather which was very unfavourable for proper curing after the tobacco was put into the barns. Such conditions can be avoided to a large extent by carlier transplanting and the use of artificial heat in the curing barns, especially during these damp muggy periods. The average grower does not fully realize the necessity of avoiding these difficulties as well as he should. By transplanting at the earliest possible period the tobacco will mature for cutting much earlier in the season which will mean a longer period of favourable weather for curing besides practically eliminating the chances of the crop being damaged in the field by early frosts and freezes. Some growers are not in favour of early transplanting, claiming that the tobacco does not yield the weight which later planting does. This is probably true in a sense, but the reasons are quite evident, because the late crop, aside from being frosted or frozen, in many cases does not have favourable weather for curing out properly and always contains a very high percentage of moisture. One can readily see that when he considers the qualities of the early and late crops there is no comparison. The early crop will practically be free from all the objectionable features, such as frozen, dark and useles leaves, fat stems, and many other unsatisfactory points. Moreover the early crop. besides being freer from the objectionable features of the late, will contain a fair percentage of fairly bright leaf which is much in demand by the Canadian manufacturer. The crop in general will be much better and there is a strong demand for the grades of better quality. The manufacturers are overstocked with the more common grades of tobacco, but are always ready to buy the best grades at a good price. Anything that will approximate in colour, texture and quality some of the grades that are bought and imported from the States would be readily bought up at a good price. This is quite evident when we consider the duty of 28 cents per pound on all foreign leaf. If grades possessing these qualities can be produced in Ontario one can readily see they would be bought by the Canadian manufacturers instead of importing, thus saving the duty, which would lower the initial cost.

When Canadian growers realize these possibilities and advantages, then steps will be taken to carry them out to the highest stages of perfection.

Since there is very little Canadian leaf exported the production should be kept in close range to the consumption. It is quite evident if there is an overproduction that this will in itself lower the prices.

It would be well for the grower to bear in mind that quality is more important than quantity and spare neither time nor patience to accomplish this end. It is more profitable to produce from 1,200 to 1,500 pounds of tobacco per acre at 12 to 14 cents per pound than to produce 2,000 pounds per acre at 7 cents per pound. Aside from the increased net returns from the crop it requires less labour to handle the smaller crop which in turn does not draw so heavily on the land, thus depriving it of less fertility.

There are wonderfully good opportunities for the grower who will take all precautions to produce the best grades of tobacco, in short, the grades in most demand by the manufacturer. These are the growers who will have no trouble to sell their crop readily at fancy prices.

The growers in general do not pay the proper attention to the growing of plants sufficient for the acreage they attempt to transplant. On the whole the main points at issue are given very little consideration and as a rule poor results are obtained. In the first place we should advocate the adoption of tight wooden frames and glass sashes for the plant beds. This will require a somewhat larger outlay in the way of initial expenses for the proper equipment than where the ordinary frames and canvas is used, but the advantages to be gained would more than repay in the way of better and much earlier plants. There is also an extra saving, for the life of ordinary canvas is only one or two years while glass sashes, when properly cared for, will last many years, so the expense in the long run would be no more. It would be wise to sow at least twice the necessary bed space required for the acreage intended, and some of the beds should be sown at different periods which would act as a safeguard in case the early plants were injured by late freezes.

Few growers practice fall ploughing of their tobacco land which would help cradicate the ravages of the cutworm after transplanting, besides it could be properly prepared for transplanting earlier in the spring. The loss caused from cutworms last year was rather large for there were few crops both early and late that were not molested throughout the whole tobacco districts of Ontario.

It would probably be well to apply manure in the fall, either before or after ploughing, depending on the nature of the soil; however, in case the soil is very porous and sandy it might be well not to apply manure before spring, principally to land on which Burley or some of the dark types of tobacco are to be grown the same year. Some growers object to applying manure in the fall, claiming that the winter and early spring rains leach out the fertility, especially the nitrogen, but this should be the case only on the very porous sandy soils. The most evident advantages of applying in the fall are that the manure would be thoroughly rotted and that the elements of fertility are immediately available soon after transplanting which would cause a rapid growth and quicker maturity. On the other hand, if not applied until late spring, the fertility, especially the nitrogen, would not be available until comparatively late in the growing season which would prolong the growth at the time it should be ripening, thus causing a heavy dark plant; besides, the green manure might injure the young plants by excessive heating of the soil from fermentation or chemical changes aside from a possible injury due to fungous diseases. The colour of the leaf, especially the Burley, would be improved by the fall application. I believe it would materially increase the percentage of bright or lug leaves.

It would be a good policy to refit the land and have it in good shape for transplanting at the earliest possible date in the spring. It is better, if plants are plentiful to run the risk of injury by frost in the early spring when the plants are small than to have the crop damaged by frost or freezes in the fall because it was too late. There

is certainly less at stake in the former case besides there is less danger of the early crop being injured than the late. It should be transplanted the first week in June, especially the Burley and flue-cured types, since they require a long time for maturing and should be harvested riper than the darker types with the exception of snuff.

. As a rule most growers cultivate their tobacco fairly well, but it might be worth while to insist upon a somewhat deeper cultivation at first, especially if the land has not been thoroughly prepared, gradually becoming more shallow as the root systems

develop.

One or two hoeings should be sufficient if the cultivator is properly handled. Cultivation should begin as soon as the plants have started to grow and be continued every 8 or 10 days until the plants become so large that injury in the way of broken leaves results from the operation. Tobacco can be cultivated until almost ready to top by using a very short single tree and greasing the legs of the horse and traces.

Many growers are inclined to top too high, and too late, thus delaying the operation longer than need be in order to secure more leaves which causes the crop to be much later in maturing and lowers the quality of the leaf. On account of the shorter season it would probably be well to top the Canadian Burley on an average of two leaves lower than the average topping for Kentucky. These conditions would be modified by types of soil and vigour of plants.

It would be well to insist on the growers removing the suckers before they are too large, depriving the leaves of nourishment and delaying the period of maturity. Some growers are of the opinion that by allowing the suckers to grow rather large, the qualities of the leaf are improved. This may be true in a way, under certain conditions, but on the whole, far greater damage results in the way of reduction in yield, broken leaves and delayed maturity, overcoming any good that may be apparent.

As a rule the grower does not prevent the horn-worm from damaging the crop as much as he should. I heard several buyers complain of the damages from this source last season.

I believe that Paris green applied, at the rate of half to 1 pound per acre, every 2 weeks, from the middle of July until within 2 or 3 weeks of harvest, would aid much in controlling this pest. Of course, hand picking should be practised also to get rid of the large worms that are not killed by the poison. The first and second broods occur in greatest numbers between the middle and latter part of July and August respectively or it would probably be safer to say about the light of the moon in these months, for the tobacco hawk or moth is very busy during the light nights depositing eggs on the tobacco. If the Paris green is applied before these periods the greater portion of the worms are killed while quite small before any damage is done. A fairly good blow-gun for applying the dry Paris green can be purchased for from \$2 to \$10. The best I know is made by Leggett and Bro. New York City, and will cost about \$10 laid down in Canada.

HARVEST, HOUSING AND CURING.

The average tobacco grewer damages his crop quite materially during these operations. In fact buyers say that it is quite common to find crops of good quality while growing in the field rendered almost useless by damage received during harvest and housing. The principal injuries incurred during harvest are torn and bruised leaves, injury by dirt and sand adhering to the leaves, also by a small percentage of sun-burn. The bruised and torn leaves are principally due to rough handling, and to poorly equipped frames for hauling from field to barn. A great many growers are too hasty and don't take the necessary pains with the crop to secure best results. The dirt and sand on the tobacco is gotten either by cutting while there is a heavy dew on the tobacco or allowing it to lay in piles on the ground to take the rain. These are unpardonable practices which are quite common and should be discontinued if the

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best results are to be obtained. This can be largely overcome by starting to cut after the dew has dried off of the tobacco and placing the plants, with the stalks split, astride sticks driven in the ground at an angle of about 65 degrees. This will keep the plants off the ground thus practically climinating the dirt besides shortening the operation because the plants are not handled so many times as when cut, piled and speared in the old way. I believe the percentage of bruised and torn leaves would be lessened in handling this way, since the operation is shortened and the percentage of broken leaves should be about the same. If handled in this way, splitting the stalks would be imperative, aside from being an essential aid for proper curing.

The curing barns in some localities are very good while in others quite poor. The percentage of house or pole burned tobacco in some sections is quite large, especially where the barns are poorly ventilated. These conditions are also produced by crowding or hanging too close in the barn caused in many cases from lack of barn room to accommodate the acreage devoted to tobacco. The growers, stimulated by the rather high prices received for previous small crops and endeavouring to get rich off the next crop, put out an acreage which surpasses the capacities of their barns and the ultimate result is a crop of inferior house-burned tobacco which is sold at a loss instead of a profit, as was the case of smaller crops that were handled with more care. Where tobacco is cut and housed the same day or the day after, it would be well to hang the sticks from 10 to 12 inches apart on the tier poles. It is safer to hang a bit too wide and rehang closer after partly cured than to hang too closely and have the crop damaged by house firing. If the weather should continue damp and muggy for some time after the tobacco is housed it would be advantageous to apply artificial heat in some way to aid the curing. This can probably best be accomplished by building a large number of small charcoal fires at regular intervals under the tobacco. By raising the temperature of the air the capacity for holding moisture is also increased and as moist air is lighter than dry air at the same temperature it will rise and give place to the latter, which, in turn will take up more moisture and will rise, thus setting up a circulation of air through the tobacco. The heat should be sufficient to warm the air throughout the barn, for, in case it is not, the warm air, when it comes in contact with colder tobacco in the upper tiers of the barn, would deposit moisture, thus aggravating instead of improving the conditions. Tobacco does not necessarily have to be crowded in the barn to cause house-burn. If the atmosphere in the barn is very humid and warm for several days these conditions will produce it if there are only a few sticks of tobacco in the barn. The organisms that produce house-burn flourish best, provided conditions are favourable, while the tobacco is in the latter stages of yellowing, and, for this reason, many growers think their tobacco is out of danger, when, in fact, the conditions are probably more ideal for its development than at a somewhat earlier period when house-burn is expected by the grower. I believe that there are great possibilities to facilitate air curing in the future; by applying artificial heat, I believe it will do much to improve the quality of the tobacco in general. especially the later crops which are more apt to encounter unfavourable It will do much towards eradicating "fat stems," "mouldy," curing weather: "house-burned" and very dark and off-coloured tobacco, which means that the crop would be more uniform and brighter in colour. Since the bright grades are very much in demand, this means a more ready sale and better prices. By the use of artificial heat to hasten the latter stages of curing, the grower will be able to strip and sell his crop at an earlier date than in the past. The damage from mouldy tobacco was rather large in some localities last year. It appeared to be worse in old open barns where the ground underneath the tobacco was very damp. I think the source of infection is carried over from one year to the other by allowing the refuse from previous crops, such as stalks and trashy tobacco, to remain in the barn. The dry spores of the fungi which cause the mould are scattered throughout the barn and

when conditions are favourable they develop on the crop after it is hung therein. If the farmer would remove all stalks and rubbish from the barn soon after stripping the crop and spray the barn and floor with some good fungicide, much of the damage from this source would be checked. The use of artificial heat in curing would also aid in checking the development of the mould.

STRIPPING AND GRADING.

These are very important phases of the work, but very few of the growers want to grade their tobacco at all. They consider it an extra task for which they receive no extra compensation. The majority strip it off and tie it all up together into very unsightly hands. The sconer they realize the benefits for grading into at least 3 or 4 grades, the better, for then both buyer and producer can see the crop to the best advantage, and the prices can be offered according to the grade and quality. In this way it can be sold to the best advantages of both parties. No doubt if a good looseleaf market could be established it would do much to educate the grower along these lines, besides, it would eliminate many personal difficulties between the grower and buyer. Of course, a market has some unsatisfactory points, for it is cheaper for the grower to sell his crop in the barn provided he could receive the same prices as on the market. The main feature that stands in the way of a market is the lack of competition in buying, but I believe this would improve with time. The buyers could pick the grades that they needed from time to time without buying the whole crop, by which in many cases at present, they are forced to take over much tobacco of an inferior quality. If a good tobacco show or exposition could be established at Harrow this would help to accomplish this end This work could be facilitated by small exhibits at the country fairs in the tobacco districts.

On account of the increased consumption, due largely to a growing population, I feel that the tobacco industry in Canada has a bright outlook. As the quality of the crop in general is improved, "Canadian leaf" will gradually supplant many grades of the various types of imported leaf thus affording a larger demand and higher prices.

It might be well to say a few words on the soils and conditions in general of different localities in the tobacco districts of Ontario.

Essex County.—The greater portion of the tobacco produced in Essex is grown in the central and southern part of the county. This is probably due to the character of the soil, which is a sandy loam. There is some tobacco grown on the heavier clay and clay loam soils in the northern and western parts of the county. Most of the soils in the tobacco sections are rather run down for tobacco, in a large measure from lack of rotation, while some, especially clay soils, are, pretty well infested with the fungus producing "root rot." A great many types and varieties of tobacco are produced in Essex. On the heavier soils in the northern and western parts, Seed Leaf, Comstock, Green River Snuff and varieties of dark tobacco are produced. Some dark tobacco is produced between Kingsville and Harrow, principally the variety known as "Golden Seal" or "Gold Leaf," some few crops of Connecticut Broad Leaf "General Grant," "Zimmer Spanish," etc. In southeastern Essex on the sand and sandy lear soils near Learnington and Ruthven, the different varieties of flue cured tobacco are produced with a fair degree of success. The results the past year were quite satisfactory to both the grower and the buyer and the acreage devoted to this type no doubt will be increased next year. This type of tobacco has a wide demand among the Canadian manufacturers and no doubt its growth will gradually increase on soils that are particularly adapted to it.

The acreage devoted to tobacco was materially decreased last year, but varied with the localities throughout the county. In some localities it was scarcely 25 per cent, while in others more than 75 per cent, a general average for the county being probably

Ontario.

50 per cent. The Essex growers, as a rule, are not over anxious to devote any more time to their tobacco crop than is necessary, and do not get the quality because so many make tobacco secondary to all other crops. The curing barns in general are not so good as in Kent.

Kent County.-While Kent county is newer in tobacco production than Essex, still in some ways I believe it is superior. In the first place, I believe the soil is more fertile, and, in general, better adapted for Burley and other types of air cured tobacco; 2nd, the barns are more modern and better adapted for proper curing; 3rd, the growers as a rule take more pains and care in handling the crop. Of course there are exceptions both ways in each county, but a general summary of all conditions would favour Kent. Like Essex the culture is confined principally to the southern part of the county. The principal centres being Cedar Springs, Blenheim, Chatham, Ridgetown and Highgate. The acreage around the above named places was somewhat reduced last year, but with the exception of Chatham and Highgate was fair, probably 80 per cent of 1913 acreage. However, the acreage south of Blenheim and Ridgetown around Rondeau, Morpeth and Palmyra was decidedly decreased to probably not more than 35 per cent of 1913 crop. It was in this section that a large amount of the 1913 crop was left on the hands of the grower, the manufacturer claiming that it was inferior in quality. The growers in this section tried to form a co-operative association to market their tobacco, and I am afraid that this was considered as an aggressive move from the part of the buyers. Many growers have a tendency to overestimate the value of their crop and very often ask prices that are extortionate for inferior crops. Some buyers claim that this locality is not adapted to tobacco, but I believe that when the crop is properly handled, the quality is about as good as on the ridge around Blenheim, at least I saw some crops the past fall that compared favourably well with the best in other localities. Of course the lighter soils on the ridge are more favourable to grades of brighter colour and finer texture.

The greater portion of tobacco grown in Kent is White Burley, but there was about

190 acres of snuff or fire cured tobacco grown around Blenheim last year.

The tobacco cured out fairly well but I did not see very many extra good crops.

Most of the tobacco was rather dark, and some crops were damaged by mould.

The co-operative association which was formed last spring, has its largest membership around Rondeau, Morpeth and Palmyra. There are also growers from various localities in Essex that belong to the association but as a rule there are very few of the best and influential growers in either county that are members. They claim about 1,000,000 pounds of tobacco of both 1913 and 1914 crops under the association. This amount is far too small if they hope to accomplish anything, besides, the tobacco in many cases, is rather poor in quality. It seems to me that it would be well for the growers to try first to produce a better quality, then, if prices do not advance accordingly, a good co-operative movement would be the next step in order. This no doubt would bring results if entered into by a large majority of the growers.

Prince Edward County.—The acreage devoted to tobacco in Prince Edward County was rather small the past year. Quite a number of farmers like to grow tobacco, but, on account of the unsatisfactory prices, and the poor chances of selling their crop, are afraid to take up the culture. The company which had been buying their tobacco up to 1913 for some reason did not take over this crop, so it was bought by another concern. There have been no barns built especially for tobacco, yet the farmers say they would build, should the culture be established sufficiently to warrant it. When I visited Prince Edward county about the 15th of July I found that the tobacco crop was as forward, if not a bit more so, than in Western Ontario. There are soils around Picton that I believe fairly well adapted for the flue cured types, but probably the greater portion is better adapted for Burley. There is quite a bit of limestone in the soil and in some places the underlying strata are almost too close to the surface for proper growth

and cultivation. This is principally true with the rolling and hilly sections. Tobacco is principally grown on the shores of East and West lake. The soil is largely a sandy loam with quite a bit of clay content. There were some fair crops the past year. I believe that the growers in a new locality will make greater efforts to produce the best results, and these are the most essential points, if the quality of the crop is to be improved, provided the soil and weather conditions are favourable. I secured a sample of very bright leaf on my last trip to Picton the latter part of December.

There is a movement on foot to have the farmers in Prince Edward grow tobacco under a three-year contract. They are requested to grade their tobacco into 3 or 4 grades and will receive prices according to the quality.

Pelee Island.—I visited Pelee Island May 15, for the first time and it was very wet on the island, due to the recent rains. The conditions, too, were worse on account of the rather heavy soil which is much inclined to be marshy in localities that have not been properly ditched and drained. The plants were only fair, since practically all were grown under cotton. There was a fair percentage of the 1913 crop left on the hands of the growers but not quite so large as in some localities on the main land.

The barns for housing and curing the crop are in most cases very good. They are better on the average than in Essex county, and, with the exception of some localities, than in Kent county,

The soil, where properly drained, should produce good Burley. In the first place, it appears to be principally a limestone formation, and secondly, the clay content in most cases is sufficient to produce body and tobacco of strong texture. On the rather strong clay soils where the tobacco is inclined to grow too large and coarse, these conditions can be improved by transplanting closer in the field.

The bright smoker grades will not be so large as if grown on the lighter sandy loam soils, but for plug wrappers and fillers the heavier clay or clay loams are essential to produce the necessary body and texture for the latter grades.

The acreage for 1914 was a bit less than in 1913. The crop in general was rather late and did not look very promising during the early part of the growing season, but later, on account of more favourable conditions the greater portion of the crop developed into fair tobacco. There were a few very late crops that did not have time to mature properly, and these were cut late and quite green.

The crop in general cured out only fair. There was quite a bit of mouldy tobacco on the southwestern part of the island. However, there were some very good crops, and I am free to say that the best crop I saw in Ontario last year was grown on the island. I believe that the quality of tobacco on the island will be improved with proper drainage, for tobacco does not thrive on a waterlogged soil.

Norfolk County.—The culture of tobacco has recently been taken up by the Lynndale farm near Simcoe in this county. The result of the past year was only fair. The percentage of rather bright leaf was quite good but the crop in general was to pad much too high and there were from two to four of the top leaves of the plants very small and inferior, besides the curing barns were very poor and some of the tol acco was injured by the winds and rains while curing.

I believe some of the soil around Simmoe would produce fairly good flue-cured tobacco. It is largely a fine sand and sandy loam which runs from a light yellow to a rather dark colour. The greatest trouble I believe would be to find a field that is very uniform, for all the various grades of sand are found in the same field. The contour of the land is rather broken, which no doubt accounts for the different kinds of soils. I believe that there are parts of Norfolk well adapted for Burley, quite a large territory southeast of Tilsonburg especially. The soil is principally a sandy loam, grading from yellow to very dark sand. The land is comparatively new and quite cheap. A good part of it is yet uncleared, but I think such land when cleared and put in good

ONTARIO.

tilth should produce a fine quality of Burley. It would probably take a couple of years to get the soil in proper shape on account of the timber and shrubbery that is now on the land. It should contain a rather large percentage of humus which I believe materially aids in the production of the best grades of Burley. This soil after being devoted to Burley and other farm crops for some time would probably be in good condition for growing "flue-cured" varieties of tobacco.

The Dominion Settlements Farm at St. Williams discontinued the growing of tobacco for 1914 on account of the unsatisfactory prices received for the 1913 crop. I think their greatest trouble was due to lack of experience in growing and handling the crop. The soil is very similar to that around Simcoe with the exception of pro-

bably a higher percentage of clay.

I believe that some experiments with flue-cured tobacco in the county would be of interest especially on the soils around Simcoe.

Lincoln County.—With the exception of the tobacco farm at Virgil there is no tobacco grown in this county. The greater portion of the land in Lincoln County suitable for tobacco is devoted to growing fruit, principally peaches and grapes. The farm at Virgil, which is producing eigar tobacco, is excellently equipped for the work, and should be able to produce some very good grades of eigar tobacco.

Welland County.—There is a little Burley tobacco produced at Fonthill and Welland in this county. The conditions here are quite similar to Lincoln County for the greater portion of land adapted to tobacco is devoted to fruit and truck farming.

Other sections.—There are other counties and localities in Ontario judging from soil and climatic conditions that should be fairly well adapted for growing both Burley and bright or flue-coloured tobacco: The southern portion of Ontario, Durham, Northumberland and Hastings.

EXPERIMENTAL PLOTS AT WALKERVILLE, ONT.

G. C. ROUTT, TOBACCO INSPECTOR.

The object of the experiment was to test some of the methods which have been recommended for controlling or checking the damage in the field caused by the fungus *Thielavia Basicola* or "Root Rot."

A strip of rather strong clay soil was selected on the tobacco farm of Walker Sons. The land had been devoted to tobacco for some time and was very badly diseased. The experiment consisted of 18 one-eighth of an acre plots or 2} acres in all. The plots were laid off in two parallel series of 9 plots each, the plots were 100 x 54½ feet and were separated by a space of 5 feet while a 10 foot space separated the two series. The first two plots, one in each series, were used for breeding and transplanting Burley at different distances and were not numbered. The remaining 16 plots were treated in the following manner. The materials used in treating the soil were acid phosphate and air slaked lime. The plots were numbered from 1 to 8 and their corresponding duplicates. The same amounts of material were to be applied both in the fall and spring, but for various reasons none of the materials were applied in the fall, so the two applications were made at different periods in the spring.

The following table gives the date and amounts of material applied to the plots.

									1]								
1	125	lb.	Acid	d Phosph	ate				May	4.	Dup.	1	125	lb.	Acid	Phosph	ate	Mar	7 4
2	1871	10		H														11	4
3	250			11												11		11	4
4	125	12	11	11		٠.	_	 							- 11	11		- 11	30
5	1873	11		11							17				22	11		- 11	30
G	250			11														- 11	`30
7	250	9.0		Slacked												lacked	Lime	17	30
8	Che	ck .						 			 77	8		Ch	eck.				

The material was sown broadcast on the plots and thoroughly worked into the soil with the disc harrow. The plots having been put in good condition before the applications were made.

The plots were redisced and thoroughly prepared for transplanting June 2. The transplanting was begun on June 3. The plots were set by hand 26 inches in the rows which were 3 feet 8 inches apart. The plants were watered when transplanted. All the acid phosphate plots were transplanted on this date but a heavy rain the night of June 3 prevented transplanting the remaining plots until June 6.

Plots No. 1 to 8 inclusive and their corresponding duplicates were transplanted to White Burley. The first two plots which were not numbered and untreated were to be used as breeding plots. Only one, however, was used for this purpose while the other was transplanted to White Burley at various distances in the row. Since every plot contained fifteen rows, 3 feet 8 inches apart, the plot devoted to Burley at various distances was divided into 5 sections with three rows in each. The three rows in each of the five sections were transplanted to Burley at 18, 20, 22, 24, and 28 inches in the row respectively. The breeding plot likewise was divided into five sections of three rows each which were transplanted to Canadian Comstock, Walkerville Comstock, Big Ohio, Improved Connecticut, Broadleaf and Improved White Burley. Since the plants were to be used for breeding purposes they were transplanted 30 inches in the rows which were 3 feet 8 inches apart.

All plants used were strong and healthy and started growing nicely soon after transplantation. A good stand was secured but the cutworms destroyed a few and the plots were re-set June 15.

The plots were cultivated and hoed June 23. The plants on all plots had started growing nicely and no difference could be detected between the plots at that time.

The plots were cultivated and hoed the second time July 3 and 4. While no particular difference could be noticed in the plots at this time there were a number of plants in all of them that were affected with the disease. This gave the plots a very irregular and spotted appearance.

On July 10 the following observations were made. Plots 1, 2, 3, and 4, also duplicates, contained a number of sick plants but the plants were larger and more uniform in growth than on plots 5, 6, 7, and 8, also duplicates, where the number of infected or diseased plants was much greater and, no doubt, accounted for their being smaller and the general appearance of the plots being more spotted. The plants on plots 7 and 8 and duplicates were a bit smaller on an average than the plants on plots 5 and 6; this was probably due to their being transplanted three days later.

The varieties on the breeding plot were growing well and seemed to be very little affected or diseased with the exception of the three rows of improved White Burley which were badly diseased. The plot that was transplanted to Burley at different distances was also badly diseased and the plants were making very slow growth.

All plots were again cultivated on July 20th and hoed on the 21st. The condition of the plots at the time was very much the same as on July 10. The plants that were badly diseased had made practically no growth while the plants that were only slightly or not infected at all were growing fairly well. The duplicate plots seemed to be better than the rest; this was probably due to the difference in the soil which was more of a sandy nature which would tend to check the disease. It is also possible that there were spots that were not diseased at all and on these the plants developed normally.

The tobacco on plots 1, 2, 3, 4, and 5, also duplicates, were topped on August 4. The tobacco on the plot where Burley was transplanted at different distances was also topped. While the tobacco on 6, 7, and 8, was rather small and topping was postponed until a later date.

On August 4th and 7th reciprocal crosses were made with White Burley on Canadian Comstock, Walkerville Comstock, Big Ohio and Improved Connecticut Broad Leaf with a fair degree of success. The remaining plots 6, 7, and 8, also duplicates, were topped on August 14.

The growth of the plants on all the plots was very slow, especially those diseased, which in many cases were too small to top.

The tobacco on plots 1, 2, 3, and 4, also duplicates and plot with Burley at different distances were cut and housed on September 4th and 5th. The plants on duplicate plots were split in harvesting while those on the other plots were unsplit and speared in the usual way. The remaining plots, 5, 6, 7, and 8, also duplicates, were cut and housed September 18th and 19th.

The tobacco cured out in very good order and the colour was fair even with the very small plants, some of which were unusually small.

The tobacco was bulked down in small piles, each plot being kept separate, November 16 and stripped, tied into hands and weighed November 17th and 18th. It was put into three grades: trash, long red, and short red or tips.

The following table gives the weights of the respective grades also total weight and percentage of stand on each plot.

No. Plot.	Trash.	Long Red.	Short Red. (Tips)	Total Wt.	Percentage of stand.
	Lb.	Lb.	Lb.	Lb.	. p. c.
Dup. 1 2 Dup. 2 3 Dup. 3 3 Dup. 4 Dup. 4 5 Dup. 5 6 Dup. 6 Dup. 6 Dup. 7 7	32 27½ 30 31 21 23 28 33 22 25 21 23 20 23 22 24	52 61½ 50 67 28 46 54 56 31 29 30 27 28½ 26 28½	21 26½ 27 22 36½ 21 23 21 23 17 21 16 18 17 17 17	105 115½ 107 120 85½ 103 112 73 77 66 71 62 69 65 70⅓	74 83 85 87 71 81 87 91 69 74 65 69 70 73 72 81
Dup. 8 Total Average	405½ 25½ lbs.	648½ 40½ lbs.	340 21½ lbs.	1,394 87½ lbs.	77

Burley at different distances:-

18 inch 20 " 22 " 24 "	es in t	11 89 88	V	71 "	9 lb. 8½ " 7 " 10 " 13 "	4 lb. 3½ " 5 " 2½ " 3 "	$\begin{array}{c} 21\frac{1}{2} \text{ lb.} \\ 20\frac{1}{2} \text{ II} \\ 20\frac{1}{2} \text{ II} \\ 20 \text{ II} \\ 25\frac{1}{2} \text{ II} \end{array}$
	r						108 lb.

From the above table it can be readily seen that the duplicate plots gave a bit better yield than the other plots, this no doubt was due to the physical characteristics of the soil which contained more sand and had a tendency to check the disease on these plots.

The reduction in yield on plot 3 and the corresponding duplicate was probably due to a ditch which had been dug the year previous to lay a pipe line. A large amount of the clay subsoil was thus brought to the surface and the soil on these plots was very hard to put in proper tilth or cultivation. Plots 1, 2 and 3, also duplicates, which received the treatment of acid phosphate about 2s days before plots 4, 5 and 6, also duplicates, gave a somewhat better yield than the latter plots. This might be a point in favour of the earlier application but could also be due to the soil on the former plots being a little stronger. The remaining plots gave about the same yield. In fact, very little difference could be detected between the last two plots treated with acid phosphate, the limed and check plots.

The percentage of stand on the plots was rather low because so many of the diseased plants did not grow and mature to sufficient size for housing and were left on the plots.

As a general summary of the experiments I do not think it shows any conclusive evidence in favour of the acid phosphate as a means of controlling the disease.

As to the tobacco on the plot transplanted to Burley at different distances no difference could be detected in the colour and quality of the tobacco although the 3 rows which were transplanted at 28 inches gave a few pounds larger yield.

The tobacco on the breeding plot was not harvested with the rest of the plots but the plants that were not used for seed purposes were turned over to the manager of the tobacco farm.

The following crosses were made on the breeding plot with a fair degree of success:—

```
405. Comstock Walkerville x White Burley.
406. Comstock Canadian x White Burley.
407. Comstock Canadian x White Burley.
408. Comstock Canadian x White Burley.
410. Imp. Connecticut Broad Leaf x White Burley.
411. Imp. Connecticut Broad Leaf x White Burley.
412. Big Ohio x White Burley.
413. Big Ohio x White Burley.
414. Big Ohio x White Burley.
415. Imp. Connecticut Broad Leaf x Imp. White Burley.
416. Big Ohio x Imp. White Burley.
417. White Burley x Imp. Connecticut Broad Leaf.
418. White Burley x Big Ohio.
419. White Burley x Comstock Canadian.
420. White Burley x Comstock Walkerville.
```

SELECTION WORK AT HARROW.

The results of the selection work at Harrow were not very favourable because the plots were located in an orchard where the characteristic developments of the different varieties were materially checked. However some fair seed plants were procured of the following varieties:—

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202. Virginia x Erzegovine x Virginia (55).
203. Erzegovine x Stolak (54).
204. Stolak (12).
205. Erzegovine x Stolak (54).
206. Stolak (7).
207. Virginia x Erzegovine x Virginia (52).
208. Stolak (7).
209. Virginia x Erzegovine (42).
210. Virginia x Erzegovine (39).
211. Virginia x Erzegovine (35).
212. Virginia x Erzegovine x Virginia (55).
213. Virginia x Erzegovine x Virginia (35).
215. Stolak (12).
216. Stolak (12).
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The following crosses were also made at Harrow:-

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422. White Burley x Warne.
423. White Burley x Warne.
424. White Burley x Gold Leaf.
425. Warne x White Burley.
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